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PREFACE

THE modern teaching of geography, like that of history, lays increasing stress on the value of original authorities. One of the first steps in this direction was the bibliography appended to Sir Archibald Geikie's *Teaching of Geography*, followed in 1897 by Dr. H. R. Mill's *Hints to Teachers and Students on the Choice of Geographical Books*, compiled at the request of the Geographical Association. The present series goes a step further, and attempts to depict the world in the language of men who have seen it. The difficulties of the task of selection, and of avoiding either deficiency or redundancy, have been exceedingly great. Many excellent extracts have had to be rejected on account of their length, or because they dealt with matters of secondary importance, or, still more often, because an individual author was already too fully represented. In several cases a certain amount of condensation has been necessary. This has been effected by omission where necessary.

It is hardly necessary to say that the series is intended as a stimulus to, and not as a substitute for, individual reading, and to this end a number of additional references are given without quotation, and a somewhat full bibliography is appended. From almost every book and paper included, a large number of excellent supplementary passages could be made. With regard to the best method of using the series, the editors do not presume to dictate to teachers; but for those who may wish to use it as a class-book an

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introduction is prefixed, summarising the geography of each continent, and referring for fuller details to the illustrative passage.

The editors desire to express their very great indebtedness to the authorities of the Royal Geographical Society, the Royal Scottish Geographical Society, the Manchester Geographical Society, the American Geographical Society, and the (American) National Geographic Society, for permission to make use of their invaluable journals, which are practically inexhaustible mines of the most recent and trustworthy information, and of which at least the British ones should be in the hands of all teachers of geography; to Lord Strathcona, High Commissioner for Canada, for permission to quote from Mr. Peacock's semi-official geography of Canada; to Lord Dunraven, Sir A. Geikie, H. M. Cadell, Esq., of Grange, E. B. Osborn, Esq., and T. C. Porter, Esq., for permission to quote from their works; to W. H. Wilkins, Esq., for permission to make an extract from the late Sir Richard Burton; to the proprietors of the *Times*, for permission to use the letters of their Canadian correspondent in 1881; to Professor R. E. Dodge, editor of the (American) *Journal of School Geography*, for permission to quote from his admirable journal; and to Messrs. Sampson Low, whose many standard books of travel form a library in themselves, Mr. W. H. Allen, Mr. Edward Arnold, Messrs. A. and C. Black, Blackie, Chapman and Hall, Chatto and Windus, Griffith and Farran, Harper Brothers (New York), Messrs. Heinemann, Hurst and Blackett, Longmans, Macmillan, the Macmillan Company (New York), Messrs. Pearson, Putnams (New York), Mr. Edward Stanford, Mr. Walter Scott, Mr. W. H. White (Riverside Press), and Messrs. Ward and Lock, for permission to quote from copyright works published by them. These obligations are acknowledged at the end of each extract.

OXFORD, *July* 1901.

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INTRODUCTION

NORTH AMERICA

NORTH America is the northern part of the New World land mass. It is joined to South America by the isthmus of Central America, which is 130 miles wide and 390 feet high at Tehuantepec, and 31 miles wide and 285 feet high at Panama in the south. The southern boundary of North America is often drawn through Panama and south of the Antilles, or West Indies, which stretch between the peninsula of Florida and South America, but in the present book we shall consider it to be the isthmus of Tehuantepec and the Florida Channel, both for physical and biological reasons. On the east North America is bounded by the Atlantic, on the west by the Pacific, and on the north by the Arctic Ocean. It is separated from Asia by the shallow Bering Strait, 36 miles wide, and from Europe by the seas between Greenland and Britain, the boundary being usually drawn between Greenland and Iceland, where a well-marked submarine ridge occurs.

The extreme south and north points of the mainland, 3900 miles apart on the same meridian (95° E.), are Tehuantepec (about 15° N.), and Cape Murchison, on the north of the Boothia Peninsula (71° 30′ N.); the west and east points, also about 3900 miles apart, are Cape Prince of Wales (168° W.), and Cape Charles, in Labrador (56° W.). The islands to the north probably reach to within 5° or 6° of the Pole, and the west coast of Greenland lies in 20° W.

The area of North America is 9,200,000 square miles (2½ times that of Europe, 184 times that of England), of which 1,500,000 square miles consists of islands, for the most part in Arctic waters. If Central America and the West Indies are included, the total area is 9,600,000 square miles, and the island area amounts to 1,600,000 square miles. The coast-line, neglecting small bays, may be estimated at about 50,000 miles.

The coast is greatly indented. In the north is the shallow, almost landlocked Hudson Bay (500,000 square miles, or 10 Englands), connected with the Atlantic by Hudson Strait, and with the northern seas through Fox Channel, beyond which lies Baffinland; and separated from Greenland by Baffin Bay and Davis Strait. Prince of Wales Island, Prince Albert's Land, and the Parry Islands are grouped round Melville Sound, which communicates with the Arctic Ocean and with Baffin and Hudson Bays. The island of Newfoundland, separated from the Labrador peninsula by the Strait of Belleisle, shuts off the Gulf of St. Lawrence, 280 miles in diameter. In the south the deep Gulf of Mexico (700,000 square miles, 14 Englands) sweeps in a great circle between the peninsulas of Florida and Yucatan. On the west the long, narrow Californian Gulf, over 700 miles long, separates the Californian peninsula from the mainland. In the north-west, between America and Asia, lies the great Bering Sea (930,000 square miles, 19 Englands), bounded by the Aleutian Islands. The west and east coasts, north of 50° N., have many fiords and bordering islands, of which Vancouver on the west coast is the largest.

Configuration.—One-third of the continent is less than 600 feet high, two-sevenths between 600 and 1600 feet, and 6 per cent over 10,000 feet. The average elevation is about 2250 feet.

North America consists of six very different regions:—

(1) The lofty island plateau of Greenland.
(2) The Hudson Bay region, the nucleus of the continent, bordered by a chain of great lakes and by the sea.
(3) The Eastern or Appalachian Highland.
(4) The Atlantic and Gulf coastal plains.
(5) The great central plains.
(6) The western mountain lands.

Greenland (700,000 square miles, 14 Englands) is buried beneath a cap of ice of unknown thickness, rising gradually from west to east, above which protrude a few mountains (Petermann's Peak, 11,000 feet). Both coasts are much indented. Great glaciers enter the sea and break off into huge icebergs. The east coast is at all times difficult of approach, owing to a belt of ice which drifts southward parallel to it, but the west coast, which is washed by warm currents, is open in summer.

The Hudson Bay region lies north of the St. Lawrence and the Great Lakes, and east of the Mackenzie River. It is a gently undulating country, highest in the peninsula of Labrador and towards its outward margin, lowest in the shallow Hudson Bay, which occupies its centre. The whole region is dotted with glacial lakes, through which the rivers flow. On its outer margin are a series of great natural depressions filled by the Great Bear, the Great Slave, Athabasca, Winnipeg, Superior, Michigan, Huron, Erie, and Ontario Lakes, and the St. Lawrence estuary.

The Labrador Peninsula (500,000 square miles, 10 Englands) is a plateau between 1500 and 2000 feet above the sea, highest in the east. Much of it is thickly forested, and the interior is little known (see p. 5). The rivers flow through numerous lakes, west to Hudson Bay, north to Ungava Bay, and south to the St. Lawrence. The Hamilton River is the only large one reaching the east coast. The water-parting is indefinite. Between the Great Lakes and James Bay lies the *Laurentian Plateau*, consisting of rounded hills, reaching about 2000 feet. The streams fall in cascades from the plateau to the St. Lawrence valley. North of the Churchill and Nelson Rivers extends the undulating, treeless, desolate region known as the Barren Grounds (see pp. 6-10, 18, 19).

The Eastern or Appalachian Highland stretches from Newfoundland to within 170 miles of the Gulf of Mexico, with an average width of about 450 miles. It is broken up by the Gulf of St. Lawrence, separating Newfoundland from the Acadian highlands, and by the Hudson rift, separating the New England highlands from the Appalachian Mountains and Allegheny plateau (see pp. 85, 86, 94-99).

Newfoundland consists of low hills, few of which are over 2000 feet. There are many lakes. The coast is formed of fiords, which run far into the land (see p. 30).

The Acadian Highlands are similar in character to Newfoundland. Cape Breton Island and the Nova Scotia peninsula, separated by the narrow Gut of Canso, continue the western hills of Newfoundland. Farther west is the lower land surrounding the Bay of Fundy, rising to the west where the Gaspe peninsula projects into the Gulf of St. Lawrence.

Prince Edward Island rises in the south of the Gulf of St. Lawrence.

The New England Highlands are higher and more rugged than the preceding. The narrow Connecticut valley (see p. 90) in the south separates the White Mountains from the Green and Hoosac Mountains. The whole region is, in reality, a plateau, above which rise rounded mountain masses (Mount Washington, 6300 feet) (see p. 89). The coasts are deeply indented, forming excellent harbours (Portland, Boston, etc.).

The Hudson rift runs from north to south. At its extremities are the cities of New York and Montreal. Lake Champlain, drained by the Richelieu River to the St. Lawrence, occupies the northern part of this rift, and forms the eastern boundary of the Adirondack Mountains, part of the Laurentian plateau. South of these is another important depression, the Mohawk valley (see p. 94, "Eastern Gateway of the United States"), connecting the Hudson rift with Lake Ontario, and forming the northern limit of the Allegheny Plateau.

The Allegheny Plateau rises gradually from the Ohio River to the south-east, and is separated by steep escarpments from the Appalachian ridges on the east. It has an average elevation of from 2000 to 4000 feet, and widens from the north-east (the Catskill Mountains, see pp. 94, 95) to the south-west (the Cumberland plateau, see p. 100-103). West Virginia and Kentucky are formed largely of limestone, which weathers into fantastic features like the Natural Bridge (see p. 225), or is washed out into great caverns like the Mammoth Cave (see p. 104). Two lower and fertile basins occur—Nashville, in the middle Cumberland valley, and the Blue Grass region of the Kentucky River.

The Appalachian Mountains.—In the narrower sense of the word, the Appalachians consist of N.E.-S.W. parallel ridges and furrows, the Appalachian ridges, separated by the well-marked depression of the Appalachian valley from a plateau to the east which has been cut up into a highland resembling that of New England. Farther east is a line of foothills, the piedmont belt of American geographers (see pp. 110, 114). The highest part of the highland is known as the Black Mountains (Mount Mitchell, 6700 feet), and the sky-line seen from the foothills is known as the Blue Ridges (see p. 95). The Appalachian valley (pp. 100-104) is drained by many rivers, including the Hudson, Delaware, Susquehanna, Potomac, James, flowing east, and the Tennessee, flowing west. The former cross the Appalachian ridges in transverse gorges, and enter the sea in the estuaries of the Hudson, Delaware, and Chesapeake.

The Atlantic Coastal Plain lies east of the Appalachian system. In the north it is almost completely submerged, the drowned valleys being represented by the depresssions of Cape Cod Bay, Long Island Sound, cutting off Long Island, and Delaware and Chesapeake Bays. In the south it is over 120 miles wide. The rivers enter it across the Appalachian foothills, forming waterfalls. Along this fall-line (pp. 113, 122) are built important cities. The southern half of the plain is fringed by lagoons (*e.g.* Albemarle and Pamlico Sounds) and swamps, like the dismal swamp of Virginia (see pp. 100, 110).

The Florida Peninsula is formed of a porous limestone, and contains many lakes and sink-holes. The southern part is a network of waterways, known as the Everglades (see p. 115).

The Gulf Coastal Plain extends up the Mississippi as far as the mouth of the Ohio, and is divided into eastern and western sections by the alluvial plains of the great river, which projects southwards into the Gulf of Mexico in a vast delta.

The Great Central Plain extends across the continent from the Eastern Highlands to the Cordilleras of the west. The eastern part consists of a prairie region north of the Missouri and Ohio, and of the Ozark plateau and the Ouashito Mountains south of the Missouri. Most of the prairies are covered with glacial moraines, and have an irregular surface rising to no great heights. West of 100° W. the Central Plain rises in monotonous, gently-rolling, treeless expanses to the foothills of the Rockies (pp. 156-162). In the south these form a dry, barren *llano estacado* (staked plain) (see p. 147), between 3000 and 5000 feet, bordered by escarpments. To the north are the plains of Kansas and Nebraska (see p. 147), covered with grass, but north of the Platte (p. 144) is a belt of sandhills, succeeded by the Bad Lands (see p. 145), both dry, infertile regions ; above them rises the great dome of the Black Hills (see p. 226), diversified by volcanic hills. The broad undulating Coteau, or heights of the Missouri, forms the divide between the Missouri and Nelson basins, and represents the southern extension of the great heights. The fertile grass-lands of the Nelson basin are drained by the southern and northern Saskatchewan (see p. 72).

A low divide runs between the last-named river and the Athabasca, which, with the Peace (see p. 19) and Liard, drains the northern part of the western plains.

The Western Mountain System consists of a series of great plateaus and basins bordered by the almost continuous chain of the Rocky Mountains in the east, and one or more parallel chains on the west. We shall consider it as represented in three political divisions: (1) the Alaskan and Canadian regions, (2) the United States region, and (3) the Mexican region.

The Alaskan and Canadian Regions may be divided into the basin of the Yukon and the plateau of British Columbia, with their bordering ranges. The Yukon basin consists of hilly land drained to the Yukon, and ending in the west in a series of peninsulas pointing towards Asia, that ending in Cape Prince of Wales lying opposite the Asiatic one ending in Deshneff. In the south are two parallel volcanic mountain ranges, the northern one forming the mountains and peninsula of Alaska, and continued through the Alaskan peninsula and the Aleutian Islands to Kamchatka. The southern, the Mount Elias Alps, stretches from the Kadiak Islands through the Kenia peninsula, the great mountains of St. Elias (18,000 feet) and Mount Logan (19,500 feet), and the Alexandria Archipelago. The coastal slopes of these mountains receive heavy rains and snows, and great glaciers are formed, of which the Muir and the Malaspina, from Mount St. Elias, are the best known (pp. 150, 151). In the east the Yukon valley is bordered by the western spurs of the Rocky Mountains, which rise close to the Mackenzie River.

In the British Columbia region the Rockies rise to 14,000 feet in Mount Columbia, where the Athabasca, the northern Saskatchewan, and a tributary of the Columbia all have their sources, while the Fraser rises a little to the north (see pp. 157, 158).

Most of the rivers flowing to the Mackenzie cross the great plains, and pierce this range. The western coastal ranges are lower and not so well defined as farther north; the outer one forms the Queen Charlotte and Vancouver Islands (see p. 79). The inner, which forms the western parapet of the plateau, is sometimes incorrectly called the Coastal Range, but should be the Northern Cascades. In the north the Stickeen and Skeena rivers drain the plateau to the west. Both the Fraser and

Columbia rivers flow to the north-west, and then turn at an acute angle due south, the former curving round the Cariboo Range and the southern part of the Gold Range, and the latter round the Selkirk Range. This region is reached from the great plains, by the Athabasca, Kicking-horse, and Kootenay passes (see p. 74).

The Rocky Mountains are continued in the United States as a broader and more complicated chain, in which the Missouri and its main tributaries, the Snake, and the Green and Grand streams of the Colorado, and the Rio del Norte, have their sources. These rivers flow through large, flat intermont basins with flat floors, locally known as parks (pp. 144, 209). The most remarkable of these parks is that of the Upper Yellowstone (see p. 171). The peaks are best developed in Colorado, where Long's and Pike's Peaks, and many others, rise to over 14,000 feet (pp. 226, 230). South of this the range gradually diminishes in height.

West of the Rockies are three well-marked regions: (1) the Colorado plateau in the south, composed of horizontal rocks, through which the Colorado and its tributaries have cut deep gorges. Of these gorges, or cañons, the most famous is the Marble Cañon, cut between 3000 and 4000 feet deep, in the painted desert of Northern Arizona. The surface consists of great flat-topped table-mountains, or mesas, with occasional steep-sided, pinnacle-like buttes (pp. 185-187). This is separated by the Wasatch Mountains (see p. 180), running south from the Yellowstone region, from (2) the Great Basin to the west, which is graphically described on p. 182. (3) In the north is the great lava plateau of Idaho, drained by the Snake and Middle Columbia rivers, both of which have cut deep gorges. The Shoshone Falls are the largest of numerous cataracts. West of the lava plateau rise the Southern Cascades, with many extinct volcanic peaks —Hood, Rainier or Tacoma (see p. 165), and Mount Shasta, the highest (see p. 94), in the extreme south. Both this range and the Coastal Range farther west are crossed by the Columbia River in transverse gorges. Between the Cascades and the Coastal Range is the valley of Oregon, whose northern extremity forms Puget Sound. South of the Cascades the Sierra Nevada, with the famous Yosemite valley (see p. 194), forms the western boundary of the Great Basin. The highest summit is Mount Whitney, in the south, beyond which the elevation sinks rapidly to the Tejon Pass. The Californian coastal ranges are broken by the great Bay of San Francisco, into which the Sacramento River, from the north, and its tributary, the San Joachim, from the south, drain the great, flat, fertile Sacramento valley.

The Mexican Mountains consist of the peninsula of Lower California, separated by the Gulf of California from the western Sierra Madre, which continue the direction of the Wasatch Mountains to the south, and form the western boundary of the Mexican plateau. This plateau rises gradually from north to south, where it is known as the plateau of Anahuac. The eastern Sierra Madre sink from the plateau to the narrow coastal plain. A great range of volcanoes terminates North America, the highest summits being Orizaba, Popocatepetl, and Colima (see pp. 206, 207).

Rivers and Lakes.—The rivers can be grouped as follows:—(1) those flowing to the Hudson Bay; (2) those draining the great lake region—the Mackenzie, draining the Athabasca, Great Slave, and Great Bear Lakes to the Arctic Ocean; the Nelson, draining Lake Winnipeg to the Atlantic; and the St. Lawrence, draining the Great Lakes to the Atlantic; (3) the Missouri and Mississippi, draining most of the central plain; (4) the short Appalachian rivers draining to the Atlantic or the Mexican Gulf; (5) the Cordilleran rivers draining to the Pacific; and (6) the inland drainage systems of the western mountains, (*a*) in the Great Basin, (*b*) in Mexico. The Atlantic drainage is much the most important. The divide between the Atlantic (including the Arctic) and the Pacific drainage coincides very nearly with the chain of the Rockies. The divide between the Arctic and Hudson Bay drainage and the Atlantic drainage runs almost east and west on the parallel of 50° N. The rivers flowing to the Arctic Ocean are frozen for many months in winter. Their upper courses, being farther south, thaw in spring sooner than the lower reaches, causing great floods.

The St. Lawrence and the Great Lakes are the most important waterways of America. From Lake Superior the St. Mary River forms rapids in its descent to Lake Huron, which is at the same level as Lake Michigan. The St. Clair River leads to Lake St. Clair and Lake Erie, from which the water escapes by the Niagara Falls (see p. 65) and gorge to Lake Ontario. The Thousand Islands and many rapids interrupt the course of the river as far as the mouth of the Ottawa, below which ocean steamers ascend. These obstacles have been overcome by canals: the Saulte Ste. Marie Canal (the Soo), at the St. Mary's Falls (see p. 65); the Welland Canal, across the Niagara peninsula; the Rideau Canal, from Kingston, on Lake Ontario, to Ottawa, on the Ottawa River, connecting Lake Ontario and the St. Lawrence. Lake Erie is also connected with the Hudson River by the Erie Canal through the Mohawk valley, and Lake Champlain and the Richelieu Canal connect the Lower St. Lawrence with the same river.

The Mississippi (pp. 129, 140) is navigable south of the Falls of St. Anthony, where the city of St. Paul has been built. A canal joins the Illinois tributary to Lake Michigan. The Wabash, Allegheny, and other tributaries of the Ohio are joined to Lake Erie by canal. The Missouri is navigable almost to the base of the Rockies, and its tributaries to the eastern edge of the great plains. The Appalachian rivers are navigable to the fall-line. The western rivers are of no importance for navigable purposes, except the Yukon, up which flat-bottomed steamers sail in summer almost to its source.

Climatic and Vegetation Regions.—Along the borders of the Arctic Ocean the mean monthly temperature is never over 50° F. The soil is frozen, except for a short time in summer, and the land is a tundra, producing only mosses, lichens, and scrubby bushes (see pp. 18, 19). Between the Arctic circle and 50° N. the highest mean monthly temperature is not over 70°. The extremes of temperature are very great in the centre and east, where most rain falls in summer. On the west coast winter rains are heaviest. This is the belt of temperate forests—birches and conifers in the north; oaks, maples, and other deciduous trees in the south; with pine-woods on the mountains (see pp. 155, 163). In the southern forest clearings the cultivation of wheat, oats, and other cereals is possible. Apple orchards are numerous in the south, and some vines are cultivated in the Mohawk valley and round Lake Erie (see p. 62).

Over most of the United States the range of temperature is great, except on the west coast, where the climate is mild, with heavy winter rains and long summer droughts. Here the vine, olive, orange, fig, and other Mediterranean fruits are cultivated, as well as much wheat in the Sacramento and Oregon valleys (see p. 229). The plateaus and basins of the mountains are arid and infertile, except where irrigated (see pp. 182, 188, 228). West of 100° W. there is a very gradual approximation to desert conditions, which are well marked in the Great Basin and the southern deserts in the plateau, and the staked plain and bad lands of the plains (see pp. 145, 182, 188, 233).

East of 100° the rainfall increases and becomes very uniformly distributed towards the Gulfs and Atlantic coasts. The higher slopes of the Appalachians are forested, but the prairies and the coastal plains, as well as the Blue Grass region and the Nashville basin, are fertile. Maize is the most important crop in the north of this region; sugar, coffee, and tobacco in the south. The sandy plains of the Atlantic coast are covered with pine-forests. The Mexican plateau is dry, with most rain in summer, but the mountains that border it have a considerable summer rainfall, while the whole of the gulf coastal plain in Southern Florida is moist, malarial, and relatively fertile, producing sub-tropical products (see pp. 115, 211).

Animal Regions.—The great animal-rearing regions of North America are: (1) the settled forest regions, where cattle are kept for dairy produce and for beef, and sheep are reared, more particularly between the Ohio and the Ottawa rivers; (2) the eastern prairies, where hogs and cattle are fattened for market on locally-grown maize, and where dairy produce and sheep are less important; and (3) the western plains, where cattle and horses feed on the grass-lands. The bison, which formerly roamed in countless herds over the prairies, is now nearly extinct. The caribou is found in the north and west. The wild animals of the Rockies are described on p. 161. Fur-bearing animals have been hunted for centuries in the forests of Northern Canada (see p. 10).

Races.—Eskimos live on the tundra (see pp. 23, 28), and Red or American Indians formerly roamed over the rest of the continent. Permanent European colonisation began four centuries ago. The northern parts have been chiefly colonised by emigrants from the United Kingdom, France, and in recent years from Germany, Scandinavia, and Russia, and Italy. Settlers of French descent are found round the Lower St. Lawrence (see p. 57) and Mississippi. Spaniards early settled in the south and intermarried with the Indians, especially in Mexico. The Indians are now a dwindling remnant gathered into small reserves on the plains (see p. 191), but more numerous and more persistent in British Columbia. Negroes were introduced from Africa to cultivate the sub-tropical plantations, and form a considerable proportion of the population south of the Ohio and Arkansas rivers. Chinese have settled along the Pacific coast.

Density of Population.—The population of North America, the far north, and the mountain and desert regions are thinly peopled. The fertile Oregon and Sacramento valleys and the irrigated areas of the plateau (*e.g.* round the Great Salt Lake) and the western plains are the most densely peopled regions of the west. The density of population steadily increases from the western plains (under 2 per square mile) eastwards (18-45 per square mile on the Atlantic plain), the greatest density occurring on the coal-fields and in the eastern states between the Chesapeake and the Ottawa, in some parts of which there are over 100 people to the square mile.

Political Divisions.—Greenland is Danish, and the small islands of St. Pierre and Miquelon are French. Newfoundland, with the Labrador coast, Canada, and the Bermudas, are part of the British Empire. The United States, including Alaska and Mexico, are Federal Republics.

Greenland consists of a few settlements on the west coast, where 10,000 Eskimos and a few Danes live, especially at Julianshaab, Godthaab, and Upernivik, and support themselves by fishing and hunting.

Canada (3,460,000 square miles; 5,250,000 inhabitants) lies north of the Great Lakes and 49° N., and east of 141° W. Both banks of the St. Lawrence below the Ottawa and the shores of the Bay of Fundy are included, but the Alexander Archipelago and a strip of the opposite coast of the mainland belong to Alaska.

Canada is a Federal Dominion. Ottawa, the capital, is the residence of the Governor-General, and the legislative centre. Canada is composed of the self-governing provinces of Nova Scotia, New Brunswick, Prince Edward Island, Quebec, Ontario, Manitoba, British Columbia, and a number of territories. The territories of *Athabasca*, *Yukon*, *Mackenzie*, *Keewatin*, *Ungava*, and *Franklin* are uninhabited, except for a few fur-traders. In *Yukon* rich gold deposits have recently been found on the Klondyke and other tributaries of the Yukon. Dawson City is the only settlement of consequence. It communicates with the outer world by the Yukon steamers, and also by the Upper Yukon and a railway over the pass.

British Columbia (383,000 square miles; 175,000 inhabitants, including about 25,000 Indians and 10,000 Chinese) lies in the western mountains, between 49° and 60° N. It is a land of forests, with gold, silver, and coal mines, and salmon rivers. Victoria, on Vancouver Island (see p. 79), the capital, is built on a good harbour near the Nanaimo coal mines, and the naval station at Esquimalt (see p. 80). Vancouver, the terminus of the Canadian Pacific Railway, is a growing port for ocean steamers. Rossland is the centre of the Kootenay mining region.

Alberta (106,000 square miles), on the western plains, is devoted to grazing and coal-mining. A railway joins Calgary to Edmonton on the North Saskatchewan River. *Saskatchewan* (107,000 square miles) has still few inhabitants, but *Assiniboia* (90,000 square miles) is gradually being broken up by the plough. Regina is the capital of these three territories, whose total population is estimated at 70,000.

Southern Manitoba (74,000 square miles, 10,000 of them water; 250,000 inhabitants) consists partly of a fertile filled-up lake basin, drained by the Assiniboia and the Red River of the North (see p. 70). It produces wheat, which is collected at Winnipeg, the commercial and political capital (see p. 69), and at Brandon.

Ontario (222,000 square miles; 2,200,000 inhabitants) lies north of the Great Lakes, and is described on p. 62.

Fort William, on Lake Superior, is an important lake port and station of the Canadian Pacific Railway. At Sudbury nickel is mined, and gold is found in many places. Much of the province is forested.

The towns and inhabitants are concentrated in the peninsula between Lakes Huron and Erie, and a narrow strip north of Ontario and the St. Lawrence above the Ottawa River. The chief towns are on Lake Ontario:—Toronto, the capital, Hamilton at the western, and Kingston at the eastern extremity—all commercial centres. Fruit and dairy farms prosper north of Lake Erie, where London is the chief town (see p. 62). Toronto and Kingston have important educational institutions.

Ottawa, the Dominion capital, is built where the Chaudière Falls bar navigation on the Ottawa River, and supply water power for saw and paper mills, many of which are in Hull, on the Quebec side of the river (see pp. 48, 49).

Quebec (347,000 square miles; 1,500,000 inhabitants, of whom three-quarters are French) (see p. 57) occupies both banks of the St. Lawrence, east of the Ottawa, and extends to James Bay. Agriculture, dairy-farming, and fruit-growing are carried on along the river (see p. 55), but the greater part of the province is forested (see p. 50). Montreal, on an island at the mouth of the Ottawa River, an important canal, river, and railway centre, is an ocean port, and has become the largest city of Canada. It manufactures sugar, cotton, and tobacco (see p. 45). Quebec, the "American Gibraltar," stands picturesquely placed on the north bank of the St. Lawrence (see p. 42). It is also a port and manufacturing centre. Both have many educational institutions. Sherbrooke and other manufacturing centres lie south of the St. Lawrence.

Prince Edward Island (2100 square miles; 110,000 inhabitants) is very fertile. Dairy-farming and fishing (lobster and oyster) are important. The capital is Charlotte Town.

New Brunswick (28,200 square miles; 320,000 inhabitants) is a hilly, timber-clad province. The capital, Frederickton, at the tidal limit, and St. John, at the mouth of the St. John River, the largest town, are both lumber centres. St. John is an ice-free port, with large trading and fishing interests (see p. 36).

Nova Scotia (20,600 square miles; 450,000 inhabitants) consists of Cape Breton Island and the peninsula of Nova Scotia. Halifax, the capital, is built on a magnificent, fortified, ice-free harbour, on the east of the peninsula. It is a naval and military station, and a terminus of the Canadian Pacific Railway (see p. 35). Annapolis is the centre of the apple orchards of the Annapolis valley (see p. 36). The Minas basin produces excellent crops, especially of hay. The ironworks of Pictou, on the north coast, are becoming important. Sydney, a railway terminus and coal-mining centre, with an excellent harbour, is the chief town of *Cape Breton Island*, which is almost divided into two by the picturesque Bras d'Or.

The *Labrador Coast*, with picturesque fjords running back into the plateau, is politically attached to Newfoundland, from which 20,000 to 30,000 fishermen come in the summer months. In winter only 4000 to 5000 people remain round the settlements of the Moravian Brethren.

The *Canadian Pacific Railway* joins the Atlantic ports of

Halifax, St. John, Quebec, and Montreal, to the Pacific ports of Vancouver, New Westminster, and Port Moodie. It is described on pp. 68-70, 74-78.

The trade of Canada is mainly with the United States, from which it receives most of its manufactured goods, and the United Kingdom, to which it sends most of its wheat, dairy, and orchard produce.

Newfoundland (42,000 square miles ; 200,000 inhabitants) is still a colony of fishermen and sealers (see p. 30). The rich mineral resources are only beginning to be exploited. Iron ore goes to Nova Scotia to be smelted. Copper ore is mined, and nickel, lead, and other minerals are known to exist. Agriculture and dairy-farming may become profitable. St. John, the capital, on the Avalon peninsula, is the chief port and fishing station. A railway crosses the island to Port Basque in the south-west, from which steamers run to Cape Breton Island. Four cables sink beneath the Atlantic at Heart's Content Bay. The French possess fishing privileges on the west coast and on that of the northern peninsula, and these are the source of constant disputes between French and Newfoundland fishermen.

St. Pierre and *Miquelon* are the stations of the French fishing fleet, and a centre for active smuggling to Newfoundland and Canada.

The Bermudas.—The Bermudas or Somers Islands consist of a score of inhabited and over three hundred uninhabited coral islands, lying 650 miles west of Cape Hatteras. They produce early vegetables for New York and other eastern cities of the United States, and are a winter resort for invalids and others seeking a mild climate. Hamilton is the capital, and St. George the largest town. The Bermudas are a British naval station.

THE UNITED STATES OF AMERICA

The United States of America is a federal republic, consisting of forty-five self-governing states, four territories, and one federal territory, together with Indian Territory, an Indian reservation. It has recently acquired the control of Hawaii, obtained the Philippines and Porto Rico by conquest from Spain, and has Cuba under its protection ; these are described in other volumes of this series.

The United States lie between 49° N. and roughly 32° N.

in the west, and between the Great Lakes and the Rio Grande del Norte and the Gulf of Mexico in the south—an area of 3,026,000 square miles. The territory of Alaska, in the extreme north-west, brings the total area of the continental territory of the United States to 3,600,000 square miles. The population is 76,000,000.

The States may be grouped as (1) the New England States, east of the Hudson-Champlain valley; (2) the Middle Atlantic States, between the Hudson and the Potomac; (3) the States of the Atlantic and Gulf coastal plains—the Southern or Cotton States; (4) the Central States, south of Lakes Michigan and Erie; (5) Northern Central States, States of the Western Plains; (6) Mountain States; (7) Pacific States; (8) Alaska.

The New England States.

	Square Miles.	Inhabitants.	Capital.
Maine	33,000	670,000	Augusta.
New Hampshire	9,300	400,000	Concord.
Vermont	9,600	340,000	Montpelier.
Massachusetts	8,300	2,500,000	Boston.
Rhode Island	1,250	400,000	Providence.
Connecticut	5,000	800,000	Hartford.

The glaciated New England Highlands are dotted with lakes, covered with forests, bordered by a fjord-coast, and crossed from north to south by the flat, fertile Connecticut valley (see p. 90). The Green, White, and Hoosac Mountains are summer resorts. The numerous waterfalls of the fall-line supply power for manufacturing, which has become more important than agriculture since the cultivation of the prairies (see pp. 113, 122). Lynn (Mass.) makes shoes; Lowell and Lawrence on the Merrimac and Fall River, all in Massachusetts, manufacture cotton, Worcester (Mass.) and Providence (R.I.) machinery. Springfield (Mass.), on the Connecticut River, has the United States armoury. Hartford, the capital of Connecticut, makes bicycles and locomotives. Bridgeport (Conn.) manufactures sewing machines. There are many excellent harbours. Portland (Me.) is the winter rival of St. John and Halifax. Boston (Mass., 550,000) was long the rival of New York as a port, but commands less easy routes to the Great West. As the outlet for the manufacturing region of which it is the centre, it does a vast trade, and is the literary capital of America, with magnificent libraries, art galleries, and educational institutions, of which Harvard University in Cambridge (88,000), one of the many contiguous towns, is the most important (see p. 223). Its rival, Yale University, is amid the elm-groves of New Haven (Conn.), the port for the Connecticut valley. Both New Haven and Boston are also important manufacturing towns.

The Middle Atlantic States.

	Square Miles.	Inhabitants.	Capital.
New York (N.Y.)	49,000	6,000,000	Albany.
Pennsylvania (Penn.)	45,000	5,300,000	Harrisburg (Penn.)
New Jersey (N.J.)	8,000	1,500,000	Trenton.
Delaware (Del.)	2,400	170,000	Dover.
Maryland (Md.)	12,200	1,100,000	Annapolis.
District of Columbia (D.C.)	70	300,000	Washington (D.C.)

Both New York and Pennsylvania cross the whole Appalachian system to Lake Erie. The east is a low coastal plain; the mountains of the centre are difficult to cross except by the natural gaps, of which those of the Mohawk, Delaware, and Potomac are the most important (see p. 94). The west is a plateau rich in coal and oil fields. The most important centres are the seaports, New York, Philadelphia, Baltimore, in the extreme east; the lake ports, Rochester, near Lake Ontario, and Buffalo, on Lake Erie; and the coal and iron centres of Pittsburg and Allegheny City in the extreme west.

Greater New York (3,500,000) includes the city of New York, on Manhattan Island, Brooklyn, on Long Island, and other towns in New York State,—but not the New Jersey towns of Hoboken, Jersey City, and Newark, though they are also part of it—making a vast city at the mouth of the Hudson, with over 4,000,000 inhabitants. New York has a magnificent harbour on both sides of Manhattan Island and of the rivers which make it an island. It is a centre of coasting as well as of oceanic shipping, and the terminus of the Erie Canal route, and of many converging railways. The city is gradually covering the whole of Manhattan Island, which, though narrow, is 12 miles long. New York has a smaller proportion of native Americans than any other city in the United States, more Irish than Dublin, and more Germans than any German city except Berlin, Hamburg, and Vienna. It contains many lofty and imposing buildings, a magnificent park, a great university, art galleries, museums, and many other educational institutions, and is now the chief publishing centre of America (see p. 120). The Hudson is a deep tidal river as far as Albany (100,000), the state capital (see p. 93). Troy (60,000), built a few miles away at the head of navigation, near the confluence of the Mohawk, obtains power for its machine shops and shirt factories from falls on four streams. The route to Montreal passes northwards at the base of the wooded Adirondacks, which are dotted with summer resorts. The Boston and New York lines unite and run westwards by Syracuse, N.Y. (140,000), Rochester, N.Y. (175,000), on the Genesee Falls, manufacturing flour, beer, and shoes, and Buffalo, N.Y. (400,000), near Niagara Falls, which generate electric power for its machine shops, breweries, distilleries, flour-mills, soap and other factories. Buffalo is an important lake port at the eastern end of the three middle lakes, on which navigation is unimpeded except by ice in winter. It is also the terminus of the Erie Canal to the Hudson. Great iron manufactures exist near the anthracite and bituminous coal-fields of Western Pennsylvania. Pittsburg, Penn. (see p. 125), where the Monongahela and Allegheny Rivers unite to form the Ohio, and Allegheny City, Penn., on the north bank of the Allegheny, have also oil-wells and refineries, and contain the most important steel-works in the United States. They occupy the site of old Fort Duquesne, which controlled the route from the Great Lakes by the Ohio River to the Mississippi, and by the Potomac to the Atlantic.

Many mining and manufacturing cities have arisen on the coal-fields of central Pennsylvania. Scranton, Penn. (110,000), where the Susquehanna enters, and Harrisburg, Penn. (400,000), the state capital, where it leaves the Appalachian ranges by steep-sided gorges, are iron centres, as is Reading, Penn. (90,000), built where the Schuylkill leaves the mountains. Paterson, N.J. (80,000), uses the 70-feet falls of the Passaic for its textile manufactures. Trenton, N.J., famous for pottery, Philadelphia, Penn. (1,250,000), at the falls of the Schuylkill, Baltimore, Md. (625,000), are all built near the upper tidal limit. Philadelphia is famed for all kinds of machinery, especially fine locomotives and ships, as well as textiles. It is known as the Quaker city, and has many excellent educational institutions, including the great University of Pennsylvania. It is also an important port for coasting and ocean traffic (see p. 122). Baltimore, Md., is built near the head of the Chesapeake, opposite the Potomac gap in the Appalachians. It is the great rival of Montreal, Boston, and New York as an outport for prairie wheat, which is brought through this gap. It imports southern produce and manufactures steel, textiles, and preserved foods. The Johns Hopkins University is famous for post-graduate studies. Washington, D.C. (280,000), is the federal capital. It is excellently planned, with wide streets, and is the most magnificent city of the United States. The Capitol is built at one end of a vast avenue, and the President's residence, the White House, at the other. It contains a vast library of a million books, the great museums of the Smithsonian Institution, and all the offices necessary for the government of a mighty nation (see p. 123).

The States of the Coastal Plain and Southern Appalachians.

	Square miles.	Inhabitants.	Capital.
ATLANTIC			
Virginia (Va.)	42,500	1,700,000	Richmond.
N. Carolina (N.C.)	52,250	1,700,000	Raleigh.
S. Carolina (S.C.)	30,600	1,200,000	Columbia.
Georgia (Ga.)	59,500	2,000,000	Atlanta.
Florida (Fla.)	58,700	400,000	Tallahassee.
GULF			
Alabama (Ala.)	52,250	1,600,000	Montgomery.
Mississippi (Miss.)	46,800	1,400,000	Jackson.
Louisiana (La.)	48,700	1,200,000	New Orleans.
Texas (Tex.)	266,000	2,500,000	Austin.
Arkansas (Ark.)	54,000	1,200,000	Little Rock.
Tennessee (Tenn.)	42,000	1,800,000	Nashville.

These states are remarkably uniform in size, most of them about the size of England, with between one and two million inhabitants. Their hot summers are adapted for growing cotton, which flourishes best on the low coastal islands of the Carolinas and Georgia, which produce the famous sea-island cotton (see p. 157). The chief ports, Norfolk, Va. (35,000), Wilmington, N.C. (20,000), Charleston, S.C. (65,000), Savannah, Ga. (45,000), New Orleans, La. (30,000), Galveston, Tex. (30,000), and Houston, Tex. (28,000), are all cotton ports. The four Atlantic ports also export lumber and turpentine from the pine-forests of the sandy plains, behind the lagoon region. These ports lie on or near the coast. Richmond, Va. (100,000), the most considerable of the southern Atlantic cities, is at the tide.head of the James River, and manufactures locally-grown cotton and tobacco. A second line of towns is found on the fall-line (pp. 113, 122), where the water-power is used in the cotton factories of Augusta, Ga. (35,000), and Atlanta, Ga. (120,000), and other towns.

Birmingham, Ala. (26,000), is the centre of the southern iron-fields (see p. 224). Nashville, Tenn. (90,000), on the Cumberland River, is the centre of the rich Blue-Grass region (see p. 138), and has large factories for iron, wood, and cotton. Memphis, Ark. (110,000), Vicksburg, Miss. (13,000), famous in the Civil War, and New Orleans, La., are the chief Mississippi ports. New Orleans is still the great outlet for the cotton of the Mississippi basin, and manufactures sugar and tobacco. It is protected from floods by great dykes or levees 160 miles long.

Chattanooga, Tenn., at the south of the Appalachian valley, is a great military centre (see p. 103), and Key West, on an island off the south-west of Florida, an important naval station. The Appalachians are wooded and sparsely inhabited. The west of Texas rises to the western plains, and is drier than the east, with ranches surrounding the Staked Plain (see p. 147).

Central States of the Mississippi Basin.

	Square miles.	Inhabitants.	Capital.
Ohio (O.)	41,000	4,000,000	Columbus.
West Virginia (W. Va.)	24,800	800,000	Charleston.
Kentucky (Ky.)	40,400	2,000,000	Frankfort.
Indiana (Ind.)	36,300	2,250,000	Indianapolis.
Illinois (Ill.)	56,650	4,000,000	Springfield.
Missouri (Mo.)	69,400	2,800,000	Jefferson City.
Iowa (Iowa)	56,000	2,000,000	Des Moines.
Kansas (Kans.)	82,000	1,500,000	Topeka.
Nebraska (Nebr.)	77,500	1,200,000	Omaha.

This region is gradually becoming the centre of population and political power in the United States. Except West Virginia, which is mainly on the Allegheny plateau, and the western part of the western states, which lie on the higher, drier western plains, these states form the fertile prairies, which produce heavy crops of maize (the "corn" of the Americans), used to fatten both hogs and cattle. They also contain great coal-fields, and manufactories and towns are rapidly expanding. Meat-preserving and the making of railway plant are by far the most important of these industries, but iron-works and ship-building are developing on the lake ports, which receive the ores from Lake Superior.

Cincinnati, O. (400,000), the chief commercial centre of the Ohio basin, Columbia, O. (130,000), in the centre of Ohio, and Indianapolis, Ind. (185,000), are all pork-packing cities and railway centres. Louisville, Ky. (215,000) (see p. 137), built where rapids interrupt the navigation of the Ohio, is a great tobacco market and manufactures whiskey. St. Louis, Mo. (650,000), at the confluence of the muddy Missouri with the clear Mississippi, is a great commercial centre, where many river and railway routes converge. It has great tobacco, beer, wood, machinery, and meat-preserving factories. Kansas City, Mo. (200,000), and Omaha, Neb. (150,000), higher up the Missouri, both outlets of the central western plains, are important meat-preserving towns and railway centres. Lincoln, Neb. (55,000), and Topeka, Kan. (31,000), are large agricultural markets.

The northern ports are on the Great Lakes, and belong to a more northern region. Of these Cleveland, O. (385,000), has great iron-works, receiving ores from the west and coal from the south, and limestone from neighbouring islands. Toledo, O. (135,000), is the western port of Lake Erie. Chicago, Ill. (1,800,000), the second city in America, was prairie land in 1830, and burned to the ground in 1870. It replaces an old fort at the head of Lake Michigan, where there is an easy portage to the Mississippi by the Illinois River, now united to the lake by canal. It is a great port and railway centre, at which western produce on its way east, and eastern manufactures on their way west, are concentrated. Great pork-packing, railway plant, ship-building, and engineering works of all kinds flourish. Two universities and many libraries and other educational institutions have been magnificently endowed by local generosity (see p. 133).

The Northern Central States.

	Square miles.	Inhabitants.	Capital.
Michigan (Mich.)	58,900	2,100,000	Lansing.
Wisconsin (Wis.)	57,000	2,000,000	Madison.
Minnesota (Minn.)	83,400	1,500,000	St. Paul.
North Dakota (N. Dak.)	70,800	200,000	Bismarck.
South Dakota (S. Dak.)	77,600	400,000	Sioux Falls.

Wheat, not maize, is the most important crop of these states. The first three border the Great Lakes. Their immense forests yield abundant lumber; Grand Rapid, Mich. (100,000), has saw-mills. The chief towns are lake ports. Detroit, Mich. (320,000), between Lake St. Clair and Lake Erie, an important railway centre, where trains are ferried to Canada, has a large trade in wheat, wool, pork, steel, and copper. Milwaukee, Wis. (275,000), on Lake Michigan, has many breweries, and machine and leather factories. Duluth, Minn. (60,000), is the western harbour of Lake Superior, whence much wheat is shipped. St. Paul, Minn.

(160,000), in the south of the state, at the head of unbroken navigation on the Mississippi, is an important trading centre adjoining Minneapolis, Minn. (210,000), at the Falls of St. Anthony, which are used to drive the flour- and saw-mills (see p. 129).

The Dakotas are engaged in wheat-growing in the east and ranching in the west.

The Mountain States.

	Square miles.	Inhabitants.	Capital.
Montana (Mont.) . .	146,000	150,000	Helena.
Idaho (Id.) . . .	82,000	100,000	Boise City.
Wyoming (Wy.) . .	98,000	100,000	Cheyenne.
Nevada (Nev.) . .	110,000	45,000	Carson City.
Utah (U.) . . .	85,000	250,000	Salt Lake City.
Colorado (Col.) . .	104,000	500,000	Denver.
Arizona (Ariz.) . .	113,000	75,000	Tucson.
New Mexico (N.M.) .	123,000	180,000	Santa Fe.

These states present a great contrast in area and population to those already considered. They are large, relatively infertile, and sparsely peopled. Only the east of Montana, Wyoming, and Colorado form good ranching country, where Cheyenne, Wy. (12,000), is the chief ranching and railway centre. Their great mineral wealth attracts a temporary population, which disappears as that becomes exhausted. The population of Nevada has decreased as the silver mines have given out. Helena, Mont. (14,000), has gold mines and smelting work. Denver, Col. (170,000), is by far the most important city, with many smelting works and railways (see p. 230). Pueblo, Col. (25,000), also smelts ores. Colorado Springs, Col. (110,000), has grown as a health resort, especially for consumptives (see p. 230).

On the plateau is Salt Lake City, on the lake of that name, which owes its prosperity to careful irrigation (see p. 228).

The Pacific States.

	Square miles.	Inhabitants.	Capital.
Washington (Wash.) . .	69,000	500,000	Olympia.
Oregon (Or.) . . .	96,000	500,000	Salem.
California (Cal.) . . .	158,000	1,500,000	Sacramento.

Wooded in the west, these states reach the arid plateau in the east. Lumber is the chief product of the mountain regions, especially fine pine-wood. The fertile valleys between the coastal ranges and the Cascades and Sierra Nevada produce much wheat. Southern California, with the climate of Southern France and Spain, has vineyards, olive-groves, and fruit-farms, yielding peaches, apricots, figs, pomegranates, as well as hardier fruits (see p. 196).

The towns are all in the great valley, or on the coast, where breaks occur in the coastal ranges.

Seattle, Wash. (85,000), Tacoma, Wash. (43,000), on Puget Sound, and Portland, Or. (90,000), all termini of trans-continental lines, compete for traffic, and export timber and wheat and canned salmon (see p. 169). Sacramento, Cal. (26,000), is the centre of the fertile valley of the same name. San Francisco, Cal. (350,000), built at the Golden Gate, which leads to a commodious bay at the mouth of the Sacramento valley, is the most important city on the Pacific coast. Its steamers trade with all Pacific ports, and carry to the eastern states and to Europe the varied products of California. Railways converge on it from north, east, and south. It is the chief manufacturing, commercial, and intellectual centre of western North America. Oakland is a suburb across the bay (see p. 200). Los Angeles, Cal. (50,000), is the southern port and outlet of California.

Alaska contains much gold at Cape Nome, in the sands of the shore, and in the sands of the Yukon and its tributaries St. Michael's, the port of the Yukon, is built at the north end of the delta. Sitka is a seal-hunting centre. Juneau is the terminus of the Klondyke route (see pp. 21-27).

MEXICO.

Mexico lies south of 32° N. and the Rio Grande del Norte and north of 15° N. It is 770,000 square miles in area (15½ Englands) with a population of 12,500,000.

The low lagoon-fringed Gulf coastal plain is unhealthy. In the south it is bounded by volcanic mountains, on the lower slopes of which are great coffee plantations. Wheat is cultivated everywhere on the plateau where water is available, and in the south and north of the Californian peninsula. Maize and tobacco are grown on the Anahuac plateau in the south-east. The henequin, or sisal hemp, is cultivated round Oaxaca. The agave is grown for its fibre, and also for its juice, which is fermented into an intoxicating drink. The western coastal plain is planted with cotton (see pp. 203-208, 211-214).

The chief wealth of Mexico is its minerals, especially silver (see p. 216) and gold, for which there are 1300 mines, the chief at Zacatecas (40,000), Potosi (70,000), and Guanjuato. Iron, copper, tin, and coal are also found. Manufactures are important in Mexico, the capital (340,000), where woollens, cottons, linen, tape, and porcelain are made.

The chief ports are Tampico (12,000) and Vera Cruz (24,000), on the Atlantic, and Acapulco, whence the galleons used to sail for the Philippines, and Mazatlan on the Pacific, all joined by railway to the chief cities of the plateau, which are connected northward with the United States railways.

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A DESCRIPTIVE GEOGRAPHY OF NORTH AMERICA

I. INTRODUCTORY

Scenery of North America

NORTH AMERICA has frequently been compared disadvantageously, as regards scenery, with Europe; and not without reason. If I except the Hudson, which is lovely, the soft beauty of Lake George, the mountainous districts of New England, of Virginia, and other spurs and offshoots of the Alleghanies, the general character of the country, more especially between the Alleghanies and the Rockies, is flat, dreary, and uninviting. The great plains, though fascinating from their vastness, and blessed with most glorious sunsets, and clothed with an exquisitely delicate colouring, are, nevertheless, inexpressibly sad and mournful. The mountains, grand as they are, cannot for a moment compare in shape, form, and general beauty with the Alps. No glaciers fill the upper portions of the valleys; the thunder of the avalanche is seldom heard. But the one attribute peculiar to the continent is vastness. Everything is huge and stupendous. Storms are fearful and violent, floods rise and sweep the country like seas. Lakes are seas. There are great deserts almost unknown. Through thousands and thousands of square miles of primeval forest, dark, impenetrable to the sun's rays, the north wind wails and whispers, while for days you may travel on the plains without seeing a tree. The so-called Rocky Mountains extend the entire length of the continent, and in places are 500 or 600 miles in width, comprising many ranges which contain important valleys and divide great and fertile plains. Through these mountain-walls the rivers have burst or sawn their way, forming chasms,—cañons,[1] as they are called—for which no parallel can elsewhere be found.

LORD DUNRAVEN.—*The Great Divide.* Chatto and Windus.

By permission of Lord Dunraven and Messrs. Chatto and Windus.

Drainage of British North America

Leaving out of consideration the Labrador or eastern shores, there are four main courses along which this great continent is drained. The first is that of the St. Lawrence. The great lakes that feed the St. Lawrence are situated on four plateaus, the highest, Lake Superior, being 600 feet above the sea-level and the lowest, Lake Ontario, 230 feet. The St. Lawrence and its lakes are estimated to contain 12,000 cubic miles of water, or more than half the fresh water on the globe: the water passing over Niagara is estimated at 20,000,000 cubic feet per minute, and the St. Lawrence, receiving all this water, with the addition of the large rivers which run into it from the north to the west of Lake Ontario, forms below Quebec a broad estuary, and enters the Gulf at Gaspe with a width of more than 100 miles.

The second great drainage area in the country is to the western, southern, and eastern shores of Hudson Bay, and is probably double the area of that of the St. Lawrence. It is but little elevated above the sea-level, with an alluvial soil, well wooded, and watered by numerous rivers. The Churchill, 700 miles long, is the outlet of numerous lakes and tributaries, and the Albany is of nearly the same length, and drains the country which lies south-west of James Bay.

The third great drainage area is that from which the waters are poured into Lake Winnipeg. The Saskatchewan, "the water that runs rapidly," rises in the Rocky Mountains in two great branches. The streams of its southern branch begin with the Belly River.[1] It is joined at Stand Off by the Kootenay, which has its rise in the lakes of that name, and further east by the Old-Man-coming-down-from-the-Crow's-Nest Pass. Some 30 miles lower down it is joined by the Little Bow River, and about 40 miles further to the west by the Bow River, bringing in streams from the neighbourhood of Calgary. From this point it becomes the South Saskatchewan, and after receiving a considerable volume of water from the Red Deer, or Elk River, it runs in a north-easterly direction to Fort à la Corne, where it unites with the north branch,[2] that has also had its origin in the eastern slopes of the Rockies and has run past Battleford and Prince Albert. From this junction their waters run over six degrees of longitude through the Cedar Lake into the north-western end of Lake Winnipeg. Into the same lake runs from the east the Winnipeg River, the outlet of the numerous lakes and rivers which lie to the north-west of Lake Superior—the Lake of the Woods, Rainy Lake and River, English River, Lonely Lake, and many others. Into the southern end of Lake Winnipeg runs from the south the Red River,[3] having its rise in the States, from the height of land where its head streams interlace with those which form the first waters of the Mississippi. The Red River takes a direct northerly course through the province of Manitoba, receiving at Fort Garry, or Winnipeg, the Assiniboine, and after a course of about 350 miles, falls into Lake Winnipeg. The outlet of this lake is through the Nelson River and the Hayes River. From the point where the Nelson leaves the lake to York Factory on Hudson Bay is 400 miles, following the course of the river, and for the last 100 miles it is navigable for steamers.

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[1] Pronounced *canyons.*

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[1] Also called Grosventre River.

[2] See "The Forks of the Saskatchewan," p. 72.

[3] See "The Red River of the North," p. 70.

I have visited the height of land of all these three: of the St. Lawrence by following up the chain of lakes to Duluth at the head of Lake Superior, and thence up the beautiful St. Louis, as it falls in a series of lovely cascades, along the line of the railway which connects Duluth with Brainerd, from a small chain of pretty lakes only a few miles distant from those in which, above Brainerd, the Mississippi has its rise; of the Red River in the high prairies above Braikenridge and Glyndon; and of its affluent, the Assiniboine, in the treeless prairies of the Souris and the alkaline lakes,[1] to the east of the Cypress Hills, where it is sometimes not easy to say in which direction the streams run; and lastly of the Saskatchewan,[2] of its head-waters on the glorious slopes of the Chief Mountain and the Kootenay Lakes, and of its affluent, the Bow River. But, of the fourth great drainage area, the Mackenzie, I can speak only by report, and I must hope that life may yet be long enough for me to visit this mighty stream, which takes its rise as the Fraser River[3] in the Cascade range of the Northern Rockies, conveying the waters of the northern part of British Columbia, and cutting its way through the mountains at the Peace River Pass, runs under that name[4] into Lake Athabasca. Here it is joined by the Athabasca, which has run in a north-westerly direction from the Yellowhead Pass, the pass through which it was originally planned to carry the Canadian Pacific Railway. Their joint waters run as the Slave River, into the Great Slave Lake, and then flow as the Mackenzie, receiving in its passage the waters of the Great Bear Lake, into the Arctic Ocean. This stream has a course of probably nearly 3000 miles, and its drainage area is certainly not less than half a million square miles.

A. STAVELEY HILL.—*From Home to Home.* Sampson Low.
By permission of Messrs. Sampson Low.

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[1] For alkaline lakes, see Staveley Hill, *From Home to Home* p. 132.

[2] For the head-waters of the Saskatchewan, see 157.

[3] See p. 76.

[4] See "The Peace River," p. 19.

II. THE FAR NORTH

The Forests of Labrador

THE Labrador peninsula, as a whole, may be said to be more or less clothed with forest, with the exception of a small area in the north-western extremity and another along the northern part of the Atlantic coast, which may be called barren grounds, like those north of the forest on the west side of Hudson Bay. In a general way, the country northward to 54° lat. is pretty well covered with continuous forest, except on the hill-tops in certain districts. Northward of this latitude its continuity is broken by treeless spots and patches of greater or less extent, and the timber is found principally in the valleys and lowlands.

Within the boundaries of the peninsula, at least twenty-four different kinds of forest trees are to be found, which is about as many as are native to all Europe. Whether we consider their extent or the variety of the trees, it will therefore be seen that the forests of Labrador are not to be despised. A certain number of the species, however, grow only in the southern part, and a few of them are confined to a small area, even there; still there is a considerable diversity in the trees of the greater portion of the peninsula.

No timber is yet exported from Labrador. The larger trees in the southern parts are fit to be sawn into lumber; but the wood of the country in general will be valuable in future only for such purposes as making paper, pulp, railway ties, telegraph poles, small spars, fencing, house-building, timbering mines, firewood, making charcoal, etc.

The trees seldom reach two feet in diameter, and are generally less than one foot. Their size appears to depend more on soil and shelter than on the latitude, for some of the finest forests are said to be found in the northern parts.

Dr. R. Bell.—*Scottish Geographical Magazine.* July 1895.
By permission of the Royal Scottish Geographical Society.

The Barren Grounds

The boundary line between the "Barren Grounds" (or "The Barrens," as they are generally called by the fur-traders) and the forest region of Canada is by no means so distinct and regular as the boundary line between the tundri or treeless wastes and the forests of Siberia.

The one merges into the other almost imperceptibly; and just as portions of the first are treeless, *e.g.* much of the south shore of the Hudson's Bay, so occasional areas of the latter, *e.g.* river valleys, the margins of lakes, and sheltered spots generally, are wooded to some extent. The influence of the local winds is a most important factor in the matter. Thus the northerly winds which prevail throughout the summer months in Baffin's Bay and Davis's Straits, and fill the north-eastern part of the American archipelago with rank Arctic ice, are the cause of the very low temperatures there and the lack of timber; while, on the other hand, the southerly summer winds of the Mackenzie valley help to extend the forest of that favoured region nearly as far as the very shores of the Arctic Ocean. Athabasca and Saskatchewan owe their possession of fine timber-limits to the prevalence of the warm western wind or "chinook,"[1] which blows out of the Pacific across the mountains; whereas Keewatin—the land "at the back of the north wind"—has little good timber, because the chinook never reaches there, and throughout the settled north-west the difference between the timber on the south or western and the northern or eastern slopes of rising ground is always very marked.

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[1] For the cause of the chinook see "Climate of Canada," p. 37.

Long before the treeless wastes are reached the forests cease to be forests except by courtesy. The trees—black and white spruce, the Canadian larch, and the gray pine, willow, alder, etc.—have an appearance of youth; so that the traveller would hardly suppose them to be more than a few years old at first sight.

Really this juvenile appearance is a species of second childhood; for on the shores of the Great Bear Lake four centuries are necessary for the growth of a trunk not as thick as a man's wrist. The explanation of this fact is that the summers are so short that, though fresh shoots are brought forth each season, there is no time for the formation of new wood. The farther north the more lamentably decrepit becomes the appearance of these woodlands, until presently their sordidness is veiled by thick growths of gray lichens—the "caribou moss," as it is called—which clothe the trunks and hang down from the shrivelled boughs. And still farther north the trees become mere stunted stems, set with blighted buds that have never been able to develop themselves into branches; until, finally, the last vestiges of arboreal growth take refuge under a thick carpet of lichens and mosses, the characteristic vegetation of the Barren Grounds.

Nothing more dismal than the winter aspect of these wastes can be imagined. The northern forests are silent enough in winter-time, but the silence of the Barren Grounds is far more profound. With the exception of the shriek of the snow-owl, or the yelping of a fox emerged from his lair, there is no sound of life during seven or eight or nine months of winter on the Barren Grounds, unless the traveller is able to hear the rushing sound—some can hear it, others cannot—of the shifting northern lights.

In May, however, when the snows melt and the swamps begin to thaw, the Barren Grounds become full of life. The sky is literally darkened with enormous flights of wild-fowl, whom instinct brings from the southern reaches of the Mississippi and its tributaries to these sub-Arctic wildernesses, where they find an abundance of food, and at the same time build their nests and rear their young in safety.

The snow-geese are the first to arrive; next come the common and eider-duck; after them the great northern black-and-red-throated divers; and, last of all, the pintail and the long-tail ducks. Eagles and hawks prey on these migratory hosts; troops of ptarmigan seek food among the stunted willows on the shores of the lakes and sloughs; and in sunny weather the snow-bunting's song is heard.

As soon as the lengthening summer day has thawed the coverlet of snows, vegetation comes on at a surprising rate —a week's sunshine on the wet soil completely transforming the aspect of the country. It is then that the caribou leave their winter quarters in the forest region—these animals are found in winter wherever the "caribou moss," on which they feed and which resembles them in colour, is found—and journey to the Barren Grounds, where the female brings forth her young.

E. B. Osborn.—*Greater Canada.* Chatto and Windus.

By permission of Mr. E. B. Osborn and Messrs. Chatto and Windus.

Travelling in the Great Lone Land

Sunday, December 21, was the coldest day on record in the North-West. The thermometer on the Saskatchewan, registered minus 62° Fahrenheit, or ninety-four degrees of frost. As we passed the lonely hut in which resided the telegraph operator, the mercury was frozen at $-45°$ in the sun.

The atmosphere was clear and bright, but cutting as the keenest steel. We kept up our circulation as well as we could, by running alongside the sleighs; this was no easy task in the deep snow, with our weight of furs and underclothing. We passed a weasel-faced old Indian, seated in state in his jumper, with a great rabbit-skin robe around him; his squaw trudged alongside. We drove by the door of the Indian agent's house, round which were a collection of painted squaws and braves in all the finery of many-coloured blankets.

Here our sleighs were piled with a supply of wood, for, right before us, stretching from the foot of the hills, lay the great expanse of the Great Salt Plains. Dream-like in immensity, there they were, hazy and indistinct, no tree nor bush upon their desert surface. From Wolverine Creek on the west, to where the Red Deer River, of Lake Winipegosis, bends to the Pasquia Hills, they stretch their mournful length, which in the afternoon sunlight of that December Sunday appeared grim and forbidding. The telegraph poles cross a narrow arm, about 45 miles from timber to timber, and we followed their guidance.

The grinding of our runners over the frozen snow was the only sound in that hideous stillness. We were to make for the log-hut in which a man was kept at Government expense, and which was a halting-place for the mail. The stars sparkled overhead; and away along the low horizon they twinkled with deceptive lustre; for each one, of the first magnitude, that shone through the deathly haze was taken to mark our goal. We were enduring all the pangs of hunger, and a dangerous drowsiness seemed to seize one, every now and again; for the circulation could scarcely be maintained. I cannot describe the sensations of that winter night. We were only a small band, in a lone land, fighting in the icy grasp of a fatal cold. Ninety-four degrees of frost. I leave it to my readers to imagine what it means. And in this temperature, in the blackness of a mid-winter night, we were to pitch tents on a treeless waste. When, at length, worn out and silent,—painfully silent,—we found our destination, it was with thankful hearts. A dim light shone through the panes of a small frost-coated window. We almost ran against the low canvas dwelling of some half-breed freighters who were here encamped. Their train consisted of about 100 ponies. Had it not been for their welcome aid, I do not see how we should have managed to rig up our camp. Every one was completely numbed. As for me, everything seemed spinning round; and I should have fallen into the sleep which knows no waking had I not been able to secure some warmth and shelter.

J. G. DONKIN.—*Trooper and Redskin.* Sampson Low.
By permission of Messrs. Sampson Low.

The Fur Trade of Canada

It is impossible to over-estimate the influence which the fur trade has exercised on the destiny of Canada. At the outset, the exploitation of the fur trade was the sole reason for the early occupation of the country on behalf of France by the chartered company of the Hundred Associates. It was the cause also of the occupation of the northern and western interior by the Hudson Bay Company. Colonisation had no place at first in the French scheme, and was only encouraged, within limits, later on, after the assumption of the affairs of New France by the Crown. Even then, the prosecution of the fur trade was found to constitute a real impediment to settlement; the life of excitement and adventure it offered demoralised the younger men in the colony, leading them to abandon the work of clearing, and to neglect agriculture. But throughout the French régime furs were the most important source of revenue upon which the economic existence of the colony rested. The St. Lawrence, with its wonderful series of lakes, and subsidiary rivers and streams, afforded admirable opportunities for prosecuting that trade over an immense extent of country. By its means also exploration was facilitated, and the French obtained at a very early date a much more accurate knowledge of the geography and resources of the interior than would otherwise have been possible, in view of the vast and impenetrable forest that covered the

Atlantic division of Canada, and which barred the approach to the fertile prairie regions of the west. The fur trade was also instrumental in opening the eyes of the French to the advantages to be derived from their strategic position in America for securing control of the whole continent. It trained, moreover, large numbers of men in the qualities of courage, endurance, and resource, a circumstance which proved of the greatest value to France in her subsequent struggles with England for the mastery of the continent. Similarly, the fur trade, as represented by the Hudson Bay Company, was instrumental in securing the early exploration of the larger portion of the interior of British North America, and in preserving it for the Empire, until the time was ripe for its incorporation into the present Dominion of Canada.

SIR C. TUPPER.—*Scottish Geographical Magazine*, January 1895.

By permission of the Royal Scottish Geographical Society.

A Hudson's Bay Fort

Built generally upon the lower bank of a large river or lake, but sometimes perched upon the loftier outer bank, stands the Hudson's Bay Fort. A square palisade, 10 to 20 feet high, surrounds the buildings; in the prairie region this defence is stout and lofty, but in the wooded country it is frequently dispensed with altogether. Inside the stockade some half a dozen houses are grouped together in square or oblong form. The house of the bourgeois and clerks, the store wherein are kept the blankets, coloured cloths, guns, ammunition, bright handkerchiefs, ribbons, beads, etc., the staple commodities of the Indian trade; another store for furs and peltries, a building from the beams of which hang myriads of skins worth many a gold piece in the marts of far-away London city—martens and minks, and dark otters, fishers and black foxes, to say nothing of bears and beavers, and a host of less valuable furs. Then came the houses of the men.

Lounging at the gate, or on the shore in front, one sees a half-breed in tasselated cap, or a group of Indians in blanket robes, or dirty white capotes; everybody is smoking; the pointed poles of a wigwam or two rise on either side of the outer palisades, and over all there is the tapering flag-staff. A horse is in the distant river meadow. Around the great silent hills stand bare, or fringed with jagged pine-tops, and some few hundred yards away on either side, a rude cross or wooden railing blown over by the tempest, discoloured by rain or snowdrift, marks the lonely resting place of the dead.

Sir W. F. Butler.—*The Wild North Land.* Sampson Low.
By permission of Messrs. Sampson Low.

The Indian Bark Canoe

In this and all other wooded regions of Canada, our means of transport is the birch-bark canoe of the natives. This craft is still constructed just as it was before the advent of the white man in America. Nothing but the prehistoric materials enters into its construction.

The rind of a mature canoe-birch tree is tough and durable, a roll of it having some resemblance to leather. The inner side is turned out to form the bottom, and the different sheets are sewn together by long split roots of the spruce, which are also used to sew the bark to a narrow frame or gunwale. It is lined inside by long strips of cedar, split as thin as cardboard, placed lengthwise, and held in position by light semicircular ribs of the same wood set closely together, their ends being caught between the inner side of the bark and the gunwale. The seams are made tight by the gum of any coniferous tree, neatly laid on. Canoes of this kind, from 12 to 30 feet in length, are used on our surveys, and, as they carry a considerable load, we are enabled to take along with us all the provisions, tents, blankets, clothing, surveying instruments, hunting, fishing, and cooking apparatus, and other things required for several months' operations. Paddles or sails are used in smooth water, but in rapids setting-poles or tracking-lines are required. The falls on the rivers, and the intervals between the nearest bays of two neighbouring lakes, are overcome by carrying the light canoes and their cargoes on the backs of the voyageurs along the "portages," or trails, which have existed at such places from time immemorial. A small canoe can be readily carried by one man, and the larger ones by two to four men. Everything being in the form of handy packages, the cargo is quickly transferred from one end of the "portage" to the other. The ordinary portage load for a man is 200 lbs., and it is held upon his back by a pack-strap or "sling," the loop of which is placed upon the forehead.

The white man has invented nothing to equal the Indian canoe for the purposes for which it is used. It is light and durable; it runs well, and is easily repaired; materials like those of which it is built may be procured to repair damages at almost any place where an accident may happen, and the voyageurs understand how to make these repairs expeditiously. It is still used by most surveyors and explorers for all their transportations, and also by the Hudson's Bay Company to take in their goods and bring out their furs.

Except for the black flies, mosquitoes, and midges or sand-flies, there is much that is enjoyable and even fascinating in exploring the northern wilds of Canada by following the canoe routes. In toiling up a rapid river, we may at any turn come face to face with a picturesque fall, never before seen by white man. After portaging across a divide, we may on the same day have the enjoyment of descending a swift-flowing stream, varied by the occasional excitement of running a dangerous rapid; or, in following a winding river, we may be surprised by its suddenly opening into a lake, so long that one cannot see the opposite end.

Much of one's success in carrying out these explorations depends upon having good voyageurs. The Indians, if well selected, are the best, although half-breeds are often very good. The party should be as small as possible, since it is easier to take along provisions and other necessaries for a small number than for a larger one. Good voyageurs understand the work so well that few orders require to be given. In the evening, as soon as the head of the party has selected camping-ground, the canoes are quickly unloaded, and turned upside down to dry. Every man has his appointed work to do, and he sets about it at once. In about one hour from the time of landing all the tents are up, the blankets spread, and supper is ready. Our beds are made upon the ground with the tips of the bows of the balsam fir, or, in its absence, of the spruce. They are laid in regular order like slates on a roof, the lower surfaces uppermost and the stem ends sloping downwards. They form a springy bed, with a delightful perfume, which would soothe one to sleep if any help were needed.

DR. R. BELL.—*Geographical Journal*, 1897.

By permission of the Royal Geographical Society.

Shooting a Rapid

Above the rapid all is still and quiet, and one cannot see what is going on below the first rim of the rush, but stray shoots of spray and the deafening roar of descending water tell well enough what is about to happen.

The Indian has got some rock or mark to steer by, and knows well the door by which he is to enter the slope of water. As the canoe—never appearing so frail and tiny as when it is about to commence its series of wild leaps and rushes—nears the rim where the waters disappear from view, the bowsman stands up and, stretching forward his head, peers down the eddying rush; in a second he is on his knees again; without turning his head he speaks a word or two to those who are behind him; then the canoe is in the rim; she dips to it, shooting her bows clear out of the water and striking hard against the lower level. After that there is no time for thought. The eye is not quick enough to take in the rushing scene. There is a rock here, and a big green cave of water there; there is a tumultuous rising and sinking of snow-tipped waves; there are places that are smooth-running for a moment, and then yawn and open up into great gurgling chasms the next; there are strange whirls and backward eddies and rocks, rough and smooth and polished—and through all this the canoe glances like an arrow, dips like a wild bird down the wing of the storm, now slanting from a rock, now edging a green cavern, now breaking through a backward rolling billow, without a word spoken, but with every now and again a quick convulsive twist and turn of the bow-paddle to edge far off some rock, to put her full through some boiling billow, to hold her steady down the slope of some thundering chute which has the power of a thousand horses: for remember, this river of rapids, this Winnipeg, is no mountain torrent, no brawling brook, but over every rocky ledge and "wave-worn precipice" there rushes twice a vaster volume than Rhine itself pours forth.

The rocks which strew the torrent are frequently the most trifling of the dangers of the descent, formidable though they appear to the stranger. Sometimes a huge boulder will stand full in the midst of the channel, apparently presenting an obstacle from which escape seems impossible. The canoe is rushing full towards it, and no power can save it. There is just one power that can do it, and the rock itself provides it. Not the skill of man could run the boat bows on to that rock. There is a wilder sweep of water rushing off the polished sides than on to them, and the instant that we touch that sweep we shoot away with redoubled speed. No, the rock is not as treacherous as the whirlpool and twisting billow.

SIR W. F. BUTLER.—*The Great Lone Land.* Sampson Low.
By permission of Messrs. Sampson Low.

An Indian Teepee

In times of prosperity these Indian teepees are by no means unsightly. They are of caribou skin stretched around and to within about three feet of the top of the poles, which number according to the size of the lodge. The sides of the circle are banked up with snow and pine-brush, and inside the smallest brush makes a clean-looking and pleasantly-smelling floor. The open fire occupies the centre, and above it, stretching from side to side of the lodge, are poles upon which the meat is placed to thaw, and from which the kettles are suspended.

Around this fire the men and women sit, cross-legged, all day, jabbering incessantly in their guttural speech that is impossible to describe in writing, and at night they roll up their blankets and stretch out with their feet at the very fire's edge. I used to wonder what on earth they found to talk about, for the clatter never came to a full stop; and when I lay down at times, trying in slumber to escape the din, it seemed as though it must all be a hideous dream. But any such illusion was speedily dispelled by the yelping of a dog that had worked its way into the lodge, and was being clubbed until it worked its way out again.

Domestic economics are a dead letter in the Indian household. There is no place for any particular thing, and nothing is ever in any particular place. The back part of the lodge, where it is too cold to sit even when the fire blazes highest, appears to be the general store-room. Everything not in immediate use is thrown there in indiscriminate confusion. If the squaw has finished stripping a caribou leg of its meat, she tosses the bone over her shoulder into the unknown behind her; if she has completed the lacing of a snow-shoe, it is served similarly; the Indian hurls his knife there when he is through with it, and the children do the same with the bones or intestines or bits of meat they may have filched from the feasting, in which they never share. And when there is a demand for any article, such an overhauling ensues as would put to shame a May-day house-cleaning.

Children are not much in evidence in the Indian household. They rarely cry, for experience has taught them that such outward expression of grief or alarm or hurt meets with much personal discomfort. If they are in the moss-bag age, which usually ends at two, they are put into a sort of hammock within the lodge, and rocked at a terrifying pace to the accompaniment of a crooning that would strike terror to the heart of any crying babe. If they are old enough to toddle, they are turned out-of-doors to tell their sorrows to the winds.

The Indian has no patience for the little solicitudes of life, nor for its frivolities. His amusements are few and simple. Outside of a something that resembles that ancient pastime of "Button, button—who has the button?" and where the penalty is a piece of tobacco, there are no games to speak of. The dancing is exceedingly awkward and crude—a shuffling about in a circle, varied by hopping up and down, and the music confined to the monotony of the single-headed drum, or mayhap an occasional fiddle picked up at the post, which in that case squeaks through a medley of reels. Their dearest recreation is sleeping, since most of their time is spent in procuring food, and the balance in resting from the toil required to obtain it.

The woman is the country drudge. Her work is never finished. She chops the firewood, dries the fish and meat, snares rabbits, and carries her catch into the post on her back; scrapes and tans the moose and caribou hides, from the latter of which she afterwards makes babiche (Northland string) by cutting it into strips an eighth of an inch wide; laces the snow-shoes, makes and embroiders with beads the mittens, moccasins, and leggings; yields the lion's share of the scanty larder to her husband when he is at home luxuriating in smoke and sleep, and, when he is away, gives her children her tiny allowance of fish, and goes hungry without a murmur.

This is the woman of the post. She of the woods, the full-blooded squaw—and there are few Indians that ever take up a permanent abode in the settlement—does all this and more. In addition to chopping the firewood, she seeks and hauls it; not only dries, but catches the fish; goes after and quarters and brings in the game her master has killed;

breaks camp and pitches it again where the husband, who has gone on ahead with no load but his gun and no thought except for the hunt, and whose trail she has followed, indicates by sticking up brush in the snow. When there is plenty she makes her meal on that which her lord leaves, and when there is little she starves, along with her children and the dogs.

Caspar Whitney. — *On Snow-Shoes to the Barren Grounds.* Osgood, McIlvaine and Co.

North American Tundra

The word tundra is used in Siberia to designate the vast, treeless, moss-covered plains bordering the Arctic Ocean, and has been adopted for similar regions on the northern shores of America. During the summer the tundra is a swampy, moderately level country covered with mosses, lichens, and a great number of small and exceedingly beautiful flowering plants, together with rushes and ferns. The most conspicuous plants are dwarf willows, which attain a height of, perhaps, two feet.

The soil beneath the luxuriant carpet vegetation is a black humus, and, at a depth exceeding a foot or so, is always frozen.

On the surface of the tundra there are many lakelets and ponds, surrounded by banks of moss, which grows even more luxuriantly than on the adjacent areas. The dense tundra vegetation extends up the sides of the hills that occasionally break the monotony of the plain, and is very similar to the deep mat of living plants decked with Alpine flowers which add such an indescribable charm to the mountains of Southern Alaska at the upper limit of timber growth. The dense vegetation forming the tundra changes by imperceptible gradations to dead and decaying matter a few inches below the surface, and finally becomes a black, peaty humus, which retains but few indications of its vegetable origin. In many instances observed near St. Michael and on the delta of the Yukon, the depth of the peaty layer was from 2 to more than 15 feet. In other localities a depth of 150 to 300 feet has been reported. The accumulation of this highly carbonaceous layer depends on the fact that vegetation grows luxuriantly at the surface, while it dies and partially decays below, but is frozen before complete decomposition takes place. This process is similar to that which occurs in the formation of peat bogs, except that a great variety of plants take the place of sphagnum, and the subsoil is always frozen.

PROF. I. C. RUSSELL.—*Scottish Geographical Magazine*, August 1894.

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The Tundra of Bering Sea

When a gale of wind is blowing the rain-clouds on shore, the meeting-place of the tundra with the water of Bering Sea presents a picture of muddy desolation that could hardly be surpassed in any part of the world. The flood-tide runs with a strong current far up the incoming rivers which find their way across the tundra, till the banks are overflowed, and salt-water lakes appear where an hour ago there was nothing but an extra depth of soft mud to show that the land had recently been submerged. And yet, directly the sun comes out and the wind moderates, even this country has a charm of its own, in its suggestion of limitless extent, in the quiet colours of its grasses and flowers, in the changing moods of the sea, and especially in the great abundance of bird life that frequents the breeding-grounds of the coast in the early autumn.

W. W. PIKE.—*Through the Sub-Arctic Forest.* Arnold.

By permission of Mr. Edward Arnold.

The Peace River

On the seventh day after leaving the Little Slave Lake we sighted the great Peace River. We had been travelling on a plateau sloping gently towards the north-west; but now the land sank down rapidly to the river at a sharp angle, and we stood upon bold bluffs overlooking the plain. Below us lay the mighty river, winding majestically among the little hills and prairies. Mile after mile of thickly-timbered rolling country stretched out before us in great sweeping lines of hill and valley.

The Peace River is here about 1300 feet wide, with an eight-mile current, and is said to be very deep. The water is so muddy that one can hear the sand hiss in the stream, and even a bucketful will make a slight noise when freshly drawn.

On account of the swiftness of the river, we were forced to go up the stream for more than a mile before we left the bank, and very arduous work it was; but finally we decided that we might safely turn across, and in a moment were whirling in the swift current. The whole landscape seemed to swim by us at an alarming rate, and row as we might, we could make no headway against the current. Here and there we saw huge pine-trees floating down the river. Now and again some under-current would catch them, and they would rear 60 feet of their length clear out of the water and then fall without warning, with a mighty smash. The least touch of one of these would have sent our frail craft to the bottom. At last, after a fearful struggle, we came to calmer water, and landed in a very exhausted condition.

Never have I seen such glorious country as we now travelled over. On our left we could see the mighty river flowing between the dark pine-trees, wooded hills, and sweeps of green prairie extending on all sides, covered with countless flowers and acres of blood-red lilies; while thickets of saskatoon, raspberry and gooseberry bushes were banked up against the timber. But it is said that it is very difficult to grow anything upon the beautiful plain on account of the early frosts. If the experience of the inhabitants is to be relied upon, the whole area fit for cultivation only comprises a few small river-side flats in many thousands of square miles.

H. S. SOMERSET.—*Land of the Muskeg*. Heinemann.
By permission of Mr. William Heinemann.
For a description of a muskeg see *ibid.* pp 77-99.

Alaska

The more thoroughly one becomes acquainted with Alaska, the more pronounced appear the contrasts in its physical features and in its plant and animal life. Owing to its high latitude, the summers are short, the winters long. In the northern portion, in summer, there are many weeks during which the sun does not set; and, again, in winter, there are many weeks during which it does not rise. The climate of the south coast is mild and equable, while in the interior the winters are severe and the summers hot. The mountains on the south coast are the loftiest on the continent; but low moss-covered plains, featureless as a prairie, fringe the borders of Bering Sea and the Arctic Ocean. The central and southern portions are covered with dense forests, while the Alaskan peninsula, the Aleutian Islands, and the broad tundras at the north are treeless. In summer the lower slopes of the mountains are brilliant with fields of flowers; while the peaks towering above these smiling gardens are covered with snow and ice throughout the year, and form desolate, frozen solitudes in which not a trace of life can be seen. In places along the south coast, great glaciers break off into the sea and send thousands of bergs afloat; while, on the adjacent shore, vegetation of tropical luxuriance overhangs the water. The south coast is fringed with thousands of islands, and its shore-line is one of the most intricate in the world; but the coast of Bering Sea and the Arctic Ocean is nearly free of islands, and is without inlets and harbours. The animals of this great northern land are clothed with warm furs, which are among the most valuable that man has adapted to his use; but the birds are largely summer migrants from more sunny lands.

The summer traveller to Sitka, Juneau, and Lynn Canal is usually deeply impressed with the extent and value of the forests clothing the shores along which he sails. The most important trees in this region are two species of spruce, but there is in addition the yellow cedar, concerning the value of which much has been written. The yellow cedar is found sparingly throughout south-eastern Alaska, and reaches as far westward as Yakutat Bay. The trees are often fine and large, and reach a height of 150 to 200 feet. The wood is fragrant, light yellow in colour, and very durable. It is said to be especially valuable for shipbuilding. Unfortunately, the supply is not so great as has frequently been stated, and should the forests of Alaska be thrown open to lumbermen, the tree will soon be exterminated. The two species of spruce which make up 99 per cent of the forests are the Menzies, or Sitka spruce, which is very abundant, and the Marten spruce, or hemlock, which grows luxuriantly, especially in the sheltered valleys among the foot-hills, and forms one of the most beautiful forests of any of the conifers. Besides the trees already mentioned, there are birches, maples, alders, and wild apples, which grow sparingly and have no commercial importance.

Beneath the dense shades of the sombre, moss-draped forests there is a great variety of shrubs, ferns, and lichens, and many bushes which produce edible berries. Of these the huckleberry and salmonberry are in greatest profusion and of greatest value. In open places near the coast, strawberries of fine flavour grow luxuriantly. In a grassy meadow bordering the coast south of Mount St. Elias, I found luscious strawberries growing in the greatest profusion. The ground was literally white with blossoms in June and pink with ripe fruit in August. Everywhere in the shade of the evergreens the ground is thickly covered with moss and lichens, growing so closely that they form a continuous carpet into which one sinks knee-deep at every step.

This brown-green mantle not only covers the ground and conceals fallen tree-trunks, but grows on the trunks and branches of the tree still standing, so that it is one of the most prominent features in the sombre woodlands.

The dense forests to which attention has been directed are confined to south-eastern Alaska, where the air is humid and the temperature remarkably uniform. It is in this region that by far the most valuable trees grow, and it is here only that timber available for building purposes is likely to be found. To the west, along the coast, the forests come to an end at Kadiak Island, and all the land to the westward, including the Alaskan peninsula and the Aleutian Islands, is treeless.

Nearly all the region drained by the Yukon and the neighbouring streams is forest-covered, but the trees have an Arctic character, and, except along some of the river bottoms, do not usually attain the size necessary for lumbering purposes.

The large game of Alaska consists of moose and cariboo, formerly abundant throughout the interior; bears of at least two species, the black and the brown, roam over nearly every portion of the mainland; deer live on the islands in the south-east; flocks of mountain sheep and mountain goats graze on the highlands both near the coast and in the interior. Of fur-bearing animals the most important are the sea-otter and fur-seal, land-otters, martens, beavers, minx, ermine, black, silver-crossed, and red foxes, besides the bears already mentioned.

PROF. I. C. RUSSELL.—*Scottish Geographical Magazine*, August 1894.
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How Life is lived in Alaska

Everything points the Alaskan native to a seafaring life. While the land cannot offer him sufficient subsistence to keep soul and body together, and affords only now and then a shelving beach for his squalid villages, the sea on the other hand gives bountifully of its kind. The Indian has come to utilise almost every product of the island channels and streams. His bill of fare consists of clams, mussels, herring and its roe, cod, salmon, halibut, porpoise, seal, duck, geese, and the eggs of aquatic birds.

He knows where the best fishing-grounds are, and the network of straits are his safe and easy highway for reaching them. His permanent winter villages are generally situated on good halibut banks, for those fish are to be caught all the year round; but as he relies also on the salmon catch to fill his winter larder, every family owns its own salmon stream, which descends in the line of succession as the most valued heritage.

Halibut fishing is done with a hook and line, and even here the sea aids the native by furnishing him with the most important part of his tackle, the line. It is made from the giant kelp, which sometimes attains a length of 300 feet in channels where the sweep of the tide is strong. It is soaked and bleached in fresh water, then stretched, dried, and worked until it becomes a strong pliable cord. The hook, which is a foot long, is cut from the heart of spruce or cedar roots. The last feature of the equipment is a heavy wooden club, with which the great fish is dispatched when hauled to the surface. With these crude implements, the Indian can catch more halibut in a given time than the white man with all modern appliances.

Having found his halibut grounds, the Indian proceeds to locate his village, if a stretch of beach affords a site. If the situation is sheltered by a point of land from the prevailing storms, so much the better, though villages are sometimes found on very exposed sites. The houses are generally ranged in a single line, and so close to the shore that when the tide is highest the water comes almost to the doors.

E. C. Semple.—*Journal of School Geography*, ii. 1898, p. 206.
By permission of Prof. R. E. Dodge.

The Yukon

The interior of Alaska is principally drained by the

Yukon River and its tributaries, and is known as the "Yukon country." The main river, the largest in North America flowing westward, is navigable for 1850 miles, from its mouth to the junction of the Pelly and Lewis Rivers, by 400-ton stern-wheel steamers drawing 4 feet of water. The Porcupine River, which joins the Yukon near the Arctic Circle, at the old Fort Yukon of the Hudson Bay Company, is navigable for 100 miles.

The main river at the old Fort Yukon is about 8 miles wide; but it gradually narrows, up stream, to about three-quarters of a mile, at the junction of the Pelly and Lewis rivers, as far as which it bears the name Yukon. Navigation is continued by the Pelly for 50 miles farther. Along the Lewis and Five Fingers, a 150-ton steamer, with powerful machinery, would be able to pass on 300 miles farther by Hootalinqua River to the head of Lake Teslin, in British Columbia.

Passengers or freight for the Upper Yukon are obliged to land at St. Michael, which is about 60 miles to the north of the usual entrance to the river. This has been the principal trading-post of the Alaska Commercial Company, and the outfitting-post for their stations on the river, for the past twenty years.

It may be asked why a location for a town has not been made nearer the mouth of the river. In explanation it may be said that the Yukon flows into Bering Sea through several mouths, that farthest north being nearly 100 miles distant from the most southern channel. The various terminal branches turn from a westerly direction to a northerly direction, and reach Bering Sea near latitude 62° N., a short distance south of Bering Strait; river steamers are therefore obliged to steam out into the open waters of Bering Sea to receive freight or passengers. So far as is known, there is not a suitable location for a town where the high water on the breaking up of the ice in the river does not overflow.

The Yukon is shallow at its mouths, the greatest depth found being only 8 feet. The ice passes out and leaves the river free for navigation about the middle of June, but it does not leave an approach open to St. Michael's till several days later. If a station could be located with easier access to the river some advantage might be gained, but until the ice had run out no progress could be made up the river.

St. Michael's is, strictly speaking, a native town. Apart from the buildings and store of the Alaska Commercial Company and the residence of its employees, a church and the residence of its pastor, the houses are those of the natives.

When passing up or down the river during the busiest season—that is, the brief summer—the traveller would form an incorrect estimate of the population were he to base it on the number of those living on the banks of the river, for he would find, were he to make a short excursion into the almost impenetrable forests and over the hills and mountains, that along the river only exist the conditions necessary for life throughout the year. The small rivulets of the interior, and the vast swampy plains, covered with snow for seven or eight months in the year, are only visited by the trapper when the skins of the marten, mink, and musk-rat are in their prime. Along the upper reaches of the Yukon and the Tanana the inhabitants are less dependent upon the river, and fish and game are abundant.

As winter travel in the Yukon country is done by toboggan, it may be interesting to describe the sledge or carriage. It should be about 7 feet 4 inches long, 7 inches high, and 16 inches wide, of strong but light timber, and with runners shod with either brass or steel, the former being preferable, because the sledge will glide over the snow more smoothly in intensely cold weather, while steel is inclined to grind and lug very much, as if it were being hauled over sand. When the weather is cold, if water is taken into the mouth and held a moment and then blown over the runner, a coating of ice will immediately form, and if this process is repeated when necessary it is surprising how much easier and more smoothly the sledge will draw. It is preferable to adopt the Eskimo mode of making sledges for Yukon travelling. They use no nails or bolts, binding the joints together with strong cords or thongs.

A. BEGG.—*Scottish Geographical Magazine*, November 1896.
By permission of the Royal Scottish Geographical Society.

Freezing of the Yukon River

The ice in the river breaks up generally about the middle of May. After breaking it runs very thickly for two or three days, when it begins to thin out and flow less and less, until at the end of a week it is clear enough for steamers, though small boats could navigate it sooner, especially if going down. There are only three and a half months in the year during which you can go to St. Michael, for the reason that Bering Sea does not open much earlier than July 1, and the river closes middle of October. In 1896 it was July 7 before the steamer could approach St. Michael. Ice freezes on the river to a thickness of 4 feet and upwards, and it takes a great deal of force to break it, and when it does break it drives for long distances in big cakes, and the river is so jammed with it that it is one of the most terrific exhibitions of force to see the Yukon River a few hours after the ice breaks.

Often it stops altogether by jamming in some sharp bend; the waters are dammed, rise, and when sufficient height is obtained it breaks away again, leaving vast piles of ice along the banks, which are not melted away for more than a month. The upper part of the river opens sooner than the lower, but generally it may be said the whole river is open to navigation about June 1. Ice begins to form again in the river about the middle of October, and continues to accumulate until about the first quarter of November, when it sets, and the river is covered with ice—not smooth as we see it in more southerly latitudes, but rough and broken to such a degree that travel over it is in most parts impossible until the winter storms have drifted the snow into the spaces between the blocks of broken ice. Then travel is possible, but often very tedious and laborious.

W. Ogilvie.—*Geographical Journal*, xiii. p. 38, 1898.
By permission of the Royal Geographical Society.

Hospitality of the Eskimo

When we approached any of the Inuit villages the women always turned out and sat on the roofs of their turf houses to get a better view of the strange boat, while the men came down to show us the best landing and help us to run the canoe up quickly beyond the reach of surf. They always lent us poles for setting up the lodge, and gave us firewood when there was no drift timber near. They have to make long expeditions up the small rivers for poles, as they require a good many for setting their fish-traps in deep water, and none of a suitable length grow anywhere near the coast. The inside of their barraboras smelt too much of rancid seal oil and general filth to be comfortable quarters at this time of year, although they would make a snug enough shelter from the savage winds that sweep this dreary coast in winter.

The natives were liberal, too, with their salmon, and would always give us a good supply for a leaf of most villainous tobacco. Some of their freshly smoked salmon are really very good, but most of them are spoilt to a white man's taste by being tied up tight in bales before they are properly dried, and allowed to turn sour. Once I objected to some fish as not being fresh enough, and made signs to that effect, chiefly with the aid of my nose. The old man went away and brought some more which were far worse. On these being rejected, he beckoned me to come with him, and leading me to a swampy spot, scraped away the loose earth with a fish spear and lifted a board which covered the top of a pit. The pit was filled to the brim with a seething mass of rotten salmon. I began to realise he had misunderstood my sign language, and thought I was objecting to his fish because they were too fresh. The salmon pit, I afterwards found, was a common institution in every village, its contents being usually reserved for winter use.

W. W. PIKE.—*Through the Sub-Arctic Forest.* Arnold.
By permission of Mr. Edward Arnold.

Greenland

All that there is of land, as we understand the term, in Greenland is simply a ribbon 5 to 25 (and in one or two places 60 to 80) miles in width, made up of mountains and valleys and deep branching fjords; a ribbon surrounded by the Arctic Sea, playground of the iceberg and the pack-ice, and itself in turn surrounding and supporting, like a Titan dam, the great white ice-cap beneath which the interior of the country is buried.

The interior of Greenland to-day is simply an elevated unbroken plateau of snow lifted from 5000 to 8000 and even 10,000 feet above the level of the sea; it is an Arctic Sahara, in comparison with which the African Sahara is insignificant. For on this frozen Sahara of inner Greenland occurs no form of life, animal or vegetable; no fragment of rock, no grain of sand, is visible. The traveller across its frozen wastes, travelling as I have week after week, sees outside of himself and his own party but three things in all the world, namely, the infinite expanse of the frozen plain, the infinite dome of the cold blue sky, and the cold white sun—nothing but these. The traveller, too, across this frozen desert knows that at no time during his journey are the highest rocks of the mountain-summits below him nearer than from 1000 to 5000 feet down through the mighty blanket of snow. Such is the interior of Northern Greenland.

E. A. PEARY.—*Geographical Journal*, xi. p. 214, 1898.
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For the inhabited coastal strip, see Nansen *Eskimo Life.* Longmans.

III. CANADA

Newfoundland

NEWFOUNDLAND has been well named the Norway of the New World. The deep fjords which indent the shores, everywhere guarded by lofty cliffs, whose forms are reflected in the clear, bright waters of the bays, have a marked resemblance to those of Norway, and are frequently not less magnificent in their scenery. Many of these great watery ravines, running inland for 80 or 90 miles, and exhibiting a wonderful variety of scenery along the great arms which they project in all directions, are on a grander scale than the famous Norwegian fjords. The great bays of Trinity and Placentia, which almost cut the island in two, have no parallel in size among the Norwegian fjords. Then in their short but beautiful summers, their bright skies, their exhilarating atmosphere, their population of fishermen,—so abundant in insular peculiarities and primitive characteristics, hidden away in nooks remote from all the outer world, quaint in manners, gracious to strangers, —the two countries resemble each other very strikingly.

No element of Nature's beauty or sublimity is wanting. In drives or rambles along the shores of bays, the road now scales the lofty hills, then dips down into silent dells, and ever and anon breaks out to the sea through wood-skirted ravines. There, in the distance, are the glittering icebergs sailing majestically past; or here, aground in some quiet cove, lies one of the white wanderers, the waves gently laving its sides, while cascades are pouring from its summit as it melts under the fierce rays of the summer sun. Everywhere the eye is greeted with some new fantastic form of cliff or rich colouring of porphyry rock, while the softness of delicate mosses contrasts with the ruggedness of bare rocks. At almost every turn of the road little gem-like lakes come into view, their waters clear as crystal, many of them with moss-clad islets sleeping in their bosoms. Such a drive in a bright summer day round those great sea-arms is something to be remembered to the close of life.

The sea-harvest, for which no ploughing or sowing is needed, is that to which the people of Newfoundland at present mainly look for their sustenance. By far the most important of its fisheries is that of the cod. The products of this fishery constitute nearly three-fourths of the whole fishery exports of the colony. It is the largest cod fishery in the world. The cod are taken on the shores of the island, on the Great Banks, a day's sail from the shore, and along the coasts of Labrador. It is wonderful to think that almost from the days of Cabot the cod fishery has been prosecuted, and notwithstanding the enormous drafts every year, there are no signs of exhaustion. There are to-day more fishermen than ever plying their avocations in these teeming waters. Cold-water seas are essential to the life of the commercial food-fishes. The Arctic current, which washes the coasts of Labrador, Newfoundland, Canada, and part of the United States, chilling the atmosphere and bearing on its bosom huge ice-argosies, is the source of the vast fish wealth which has been drawn on for ages, and which promises to continue for ages to come.

It is not, however, owing to its temperature alone that the Labrador current is favourable to the development of the commercial fishes, though that is essential to their growth. The cold current brings with it the food on which these fishes thrive. So far from being unfavourable to the production of life, the Arctic seas and the great rivers they send forth are swarming with life, constituting, in the words of Professor Hind, "in many places a living mass, a vast ocean of living slime." This living slime of the ocean is most abundant in the coldest water, and especially in the neighbourhood of ice. The ice-laden current from Baffin's Bay brings with it these forms of marine life, from the diatom to the minute crustacean, from the minute crustacean to the crab or prawn, together with the molluscous animals and starfish, in vast profusion. The slime-food sustains the minute crustaceans, and these in their turn furnish food for the herring which swarm on the shores, in the bays, and especially on the Grand Banks. The herring, with multitudes of smaller forms, are devoured by the cod. The mackerel, the hake, the haddock, the salmon, all find abundant supplies. In this way the great fishing interests, on which millions depend for their daily bread, are as dependent on the Arctic current as the farming interests on the rain and sunshine which ripen the crops.

M. HARVEY.—*Newfoundland in* 1897. Sampson Low.
By permission of Messrs. Sampson Low.

The Seasons in Acadia

April ushers in some fine days, and the increasing power of the sun tells upon the masses of snow in the fir-woods and the rotting ice in the lakes; and at last comes a fierce storm of wind and rain, with a warm, oppressive atmosphere. The snow, with the exception of a patch or two in hollows, has all disappeared from the face of the earth, and the great monotonous fir-woods themselves lose their dark wintry aspect and blackness, assuming a lively green tint, and emitting, as one wanders through their sunny glades, faint odours of that delicious aroma which prevades the atmosphere in the heat of midsummer. We cling to these balmy spring days all the more closely as we dread the chill easterly wind, and the dark sea-fog which may cover us with its gloom on the morrow; for we live on the shores of the "mournful and misty Atlantic," and many a spring day must be darkened by fog and chilled by gales from the floating ice-fields drifting down the coast, before the tardy green leaves of the hardwood fully appear.

About the 20th of May the presence of spring is perceptible in the sprouting of little leaves on almost all the smaller deciduous shrubs, simultaneously with the light green sprays of the larch. From this time vegetation progresses with extraordinary rapidity; a delightful change in the atmosphere almost invariably occurs; the cold easterly winds cease; balmy airs from the westward succeed, and assist in developing the tender buds and blossoms, and in a few days the face of the country, lately so bare and dreary, glows with warmth and beauty. All nature rejoices in this pleasant season; the songs of the hermit-thrush, robin, and of a host of warblers, the cheerful piping of the frogs throughout the warm night, and the soft west wind, which borrows an indescribable fragrance from the blossoms of innumerable shrubs and plants now flowering in the woods and on the barrens, afford charms which more than repay for the gloom of the long and trying winter.

The red blossoming maple now exhibits crimson flower-clusters topping each spray, almost vying in colour with the glories of its autumnal foliage; the Indian pear and wild cherry, growing in great abundance throughout the country, seem overburdened with their masses of delicate white blossoms, and impart a fragrance to the air, in which are mingled a thousand other scents; for in this land nearly every shrub and plant bears sweet-smelling flowers. The blueberry and huckleberry now show their pretty heath-like blossoms, in promise of the abundant harvest of delicious fruit which is so acceptable to birds, bears, and bipeds throughout the fall; the rich carpet of mosses in the fir-woods is adorned with a great variety of flowers, and large tracts of country are tinted by the rich lilac flower-masses of the wild azalea, which blossoms even before its leaves have sprouted from their buds.

This delightful season is, however, of short duration—

imperceptibly losing itself in the increasing heat and development of summer. A few days change the aspect of the country marvellously, and the broadly-expanding leaves of the maple produce a dense canopy of shade in the forest. Nothing can be brighter than American spring verdure, nor does it degenerate into the dull heavy green of English summer foliage—the leaves maintaining their vernal hue on the same branch, side by side with the brilliant orange scarlet of their dying fellows, at that beautiful season, the fall of the leaf.

The advent of summer is characterised by the waning of the flower-masses of the rhodora, and the succession of the crimson whorls of the kalmias. The swamp vegetation, headed by the Indian cup and blue flag, flowers abundantly in ponds and in moist hollows in the woods, the dark-red drooping petals of the former prettily contrasting with the blue of the iris.

The fir-forest at this season becomes intensely heated, and emits a strong aromatic odour. Where a tree has fallen, its withering branches fill the air for some distance around with a most delightfully fragrant scent of strawberries.

Lastly comes the flora of autumn, with its asters and golden-rods; and these, choosing open barrens and fields as their residence, leave the woodlands almost without a flower.

In September the full brightness of the fall colour is brought out on deciduous foliage; fast fading, however, towards the close of the month, and altogether disappearing by the end of October, the last lingering phases of autumnal glory being the rich golden-yellow hue assumed by the larch, and the dark Indian-red of the leaves of the oak and whortleberries.

Then comes the Indian summer, a season of dreamy delight, when a warm, hazy atmosphere mellows the rich brown foreground and distant blue hills of the woodland picture. The hermit thrush now warbles forth his farewell from the spruce groves; the robins congregate on the barrens, busily picking the remains of the berry-harvest ere their departure for the south; and the squirrels and wood-marmots hasten into their granaries their winter supply of acorns and beech-mast.

November is not far advanced before cold northerly winds and black frosts remove all traces of the beautiful fall. The bear and the marmot hibernate; the moose select their winter yards; the last detachments of lingering robins depart, and the retreating columns of wild geese are soon followed by the fierce driving storm, which buries the hard frozen ground under the first snows of the long American winter.

CAPTAIN CAMPBELL HARDY.—*Forest Life in Acadie.* Chapman and Hall.

Halifax, Nova Scotia

The chief feature of Halifax, the Atlantic terminus of the Canadian Pacific Railway, is its harbour, which undoubtedly is one of the finest in the world. This harbour is accessible at all times, and experts assert that a thousand vessels might safely rest therein.

Halifax itself is located on a rocky peninsula, the harbour being to the south and east of it. The water narrows on reaching the upper end of the city, but again expands into what is called Bedford Basin, which is said to contain 10 square miles of safe anchorage. There is nothing architecturally interesting in the city, yet as the chief naval station of British North America, and the only place in the Dominion now occupied by Imperial troops, it possesses an interest of its own. The surrounding country is very lovely, especially in the Annapolis valley.

STUART CUMBERLAND.—*The Queen's Highway.* Sampson Low.
By permission of Messrs. Sampson Low.

Annapolis

The Windsor and Annapolis Railway runs through some of the most famous scenery in Canada, for after passing

Halifax, with its citadel and park effects, and Windsor with its meadowy hills, and Evangeline's Grand Pré, one comes to the valley of the Gaspereau, the Annapolis valley, and Annapolis itself, every one of them halting-places to the pilgrim in quest of the picturesque.

Not far from Wolfville is the famous Gaspereau valley, with its clear mountain stream threading it amid tangles of goose-grass, lady's slipper, golden-rod, crimson yarrow, and glorious clusters of crimson wild roses, which, like the thickets of wild raspberries, make all Acadia picturesque with their patches of bright colour.

The whole valley is, to an American, singularly beautiful, with its aging homesteads, and its rich orchard-studded slopes. To an Englishman it is less impressive, for just such a valley he will often see in Kent or Sussex. The same applies to the Annapolis valley.

Annapolis is the oldest town on the continent, north of Florida, a quaint old town with old wooden colonial houses overgrown by creepers. It amply makes up in picturesqueness for the tamer scenery of the valleys which are its avenues from Halifax.

DOUGLAS SLADEN.—*On the Cars and Off.* Ward and Lock.

By permission of Messrs. Ward and Lock.

St. John, New Brunswick

Few things in Canada impressed me more than St. John, a city of spires, built upon a lofty acropolis, dominating one of the world's great harbours. Truly impressive is it to land at St. John. It rises up so quickly from the water's edge ; and no town in Canada has statelier streets.

Mr. Bliss Carman, the delightful Canadian poet, drove us out, just before dinner, to see the falls of the noble river from which St. John takes its name. These are, in a way, the most remarkable in the world. Through a gorge with angry black cliffs the river at low tide hurls itself in a mighty waterfall into the harbour, while the incoming tide, when it gets sufficiently high, pours back over the rocky wall into the river; and at certain states of the tide there is no fall at all, but a smooth river navigable by boats and rafts—the fact being that there is a mere wall of rock running across the bed of the river in a closely-shut gorge.

When the phenomenon was explained to me, and I saw the mad swirl as the huge volume of water poured over the cliff at the turn of the tide, I said I thought it was very high-spirited of the citizens to preserve this wonder of the world when a dollar's worth of dynamite would blow up the barrier and make everything plain sailing. Then he expounded to me the origin and use of this *lusus naturæ.* A volcanic upheaval elevated a strip of the New Brunswick coast, leaving the fertile country behind, lying round the stately river and its tributaries—about the best land in Canada—below sea-level; and if it were not for the double waterfall the ravening tides of Fundy would turn the garden of New Brunswick into another Zuyder Zee.

DOUGLAS SLADEN.—*On the Cars and Off.* Ward and Lock.

By permission of Messrs. Ward and Lock.

Climate of Canada

In the Dominion of Canada, a country embracing one-half of the continent of North America, we naturally find a very diversified climate. On the Pacific coast, with the ocean on the one side and lofty mountain ranges on the other, it is moist and temperate; while on the east side of the Rocky Mountains, on the high, level plateaus of the North-West Territories, and in Manitoba, is found a climate with large extremes of temperature, but withal a bright, dry, bracing, and healthy atmosphere. In the valleys of the St. Lawrence and Ottawa rivers a cold but bright, bracing winter is followed by a long, warm, and delightful summer; while the maritime provinces lying between the same parallels of latitude as France, and with shores laved by the waters of the Atlantic, rejoice in a climate the praises of which have been sung by successive generations of their people.

The climate of those portions of the Territories which lie near the mountains is one of peculiar interest, presenting as it does features which are unknown in countries nearer the sea and away from the mountains. Among the marked features are the rapid changes of temperature which frequently occur in short intervals of time; the great variations in different years, both of the mean temperature of the winter season and of the summer rainfall; also the fact that the summer season in the great Mackenzie basin, just under the Arctic circle, is nearly as warm as in Alberta.

The phenomenon of the rapid changes in short intervals is accounted for and explained by the now well-known Chinook or Fœhn effect, which is met with to a greater or lesser extent under the lee of mountains on the windward side of which moisture is precipitated.

For long it was not understood why comparatively warm ocean winds should often, blowing across high cold mountain ranges, descend on the other side at a higher temperature than when at sea-level. Dr. Hahn of Vienna was the first to explain the enigma as due to the retardation in the rate of cooling of the air during ascent, caused by the condensation of moisture, and subsequently the mechanical heating by compression in descent on the other side of the mountains. It is when the movement of a storm-centre causes a south-west and westerly flow of air across the Rocky Mountains from the Pacific that the chinook blows over our western prairies. Sometimes a change of wind from north and north-east to south-westerly will, in Alberta, means a rise of temperature from, perhaps, 30° to 40° in a few hours.

The variableness of seasons, while not entirely, is certainly to a very great extent due to the varying position of the mean track of storm-centres in different years. The average mean track for January, deduced from many years, is across southern British Columbia; but in some winters the centres persistently move farther south than in others, and pass into the continent over Washington or Oregon states, and then the chinook does not blow east of the mountains in the Canadian territories, but north-east and north winds prevail, accompanied by continual low temperature. In other years the storm-centres just as persistently move across northern British Columbia, and then the chinook is the rule rather than the exception, and the weather under the lee of the mountains keeps mild.

The province of Ontario can boast of as many distinctly different climates as can any country in the world.

That part of the province which lies immediately north and north-east of Lake Superior, and which forms the northern watershed of that great lake, has a long cold winter, and at times extremely low temperatures are recorded; indeed, scarcely a winter passes without 50° below zero being registered at White River, a station on the Canadian Pacific Railway. As a rule, the snow does not disappear from the woods until the beginning of May, after which time, however, the summer advances very rapidly, and four months of superb weather follow. Travelling east and south-east, the climate quickly improves, and in the valleys of the Ottawa and the Upper St. Lawrence we find a moderately cold winter, but a singularly exhilarating, bracing atmosphere, which makes a zero temperature by no means unpleasant. Signs of spring are not wanting; early in April and by the beginning of May foliage is well advanced, and then follows a decidedly warm summer. The whole of this region is, between the middle of May and middle of September, included between the same isotherms as the greater portion of France, and, after a protracted autumn, winter sets in again in November.

In the peninsula of Ontario, or that portion of the province which lies east of Lake Huron and north of Lake Erie and the western portion of Lake Ontario, the winters are by no means severe, and the summers are seldom oppressively hot, this being due to the tempering influence of the lakes by which this part of Ontario is surrounded.

In the western counties the April mean temperature corresponds nearly to that of southern Scotland, and in May the mean temperature of the whole district is slightly higher than for the south of England. The temperature conditions during the summer months may, as in the Ottawa and Upper St. Lawrence valleys, be compared with those of France, the normal temperature for July ranging between 66° and 72°. September and October are generally delightful months, and seldom does snow remain on the ground until well on in December, except on the high lands of the interior counties. That portion of Ontario which lies immediately east of the Georgian Bay, the district of Muskoka, at an elevation of 700 feet above the sea, abounding in small lakes, possesses a wonderfully bracing atmosphere, which, with a very high percentage of bright sunshine and a pleasant temperature, has made this region a summer resort much frequented by people from the cities and towns farther south.

The importance of the covering of snow during the more severe winter weather cannot be over-estimated, as it protects the roots of trees and herbage, and, besides this, enables those engaged in the lumbering trade in the northern parts of the provinces to get the timber from the bush to the banks of the streams on which the huge logs are floated down to the mills, when in the early spring the rapid melting of the snow and ice causes a flooding of all watercourses.

PROF. R. F. STUPART.—*Scottish Geographical Magazine*, February 1898.

By permission of the Royal Geographical Society.

Sailing up the St. Lawrence.

By noon we were, with our pilot at the masthead—for the fog lay only a few feet above the water—slowly steaming up the mighty river, losing many of our passengers at Rimouski, where the mail tender meets the steamer and the inter-colonial railroad is available for any one to whom a few hours are of importance.

The wooded southern shore of the St. Lawrence was plainly visible, and the air was laden with the delicious scent of pine forests, while the eye was charmed and rested after the weary waste of waters by the ever-varying green and gray of the distant hills and the spotlessly white dwellings of the French Canadian settlers along the shore.

The last part of the voyage was as charming as the prelude to it was wretched. We left the fog far behind, and had that rarity in a Canadian summer, a cloud-flecked sky, giving additional beauty to the scene, by the shadows which alternated with the most glorious sunshine over the rippling water, rocky islands, and steep fir-clad banks. The whole of the river, after it becomes narrow enough for its shores to be seen, is exceedingly beautiful, with its constant succession of lovely islands and the most perfect background of hills, looking perfectly blue in the evening light, with here and there a warp of mist flitting across them.

At last we passed on the north bank the splendid falls of Montmorenci, and soon after came into full view of one of the three most grandly situated cities in the world—Quebec. Edinburgh surely deserves a place among them, but who will agree as to the third? By the time that the big ship had made a circle under the frowning Heights of Abraham, and was lying alongside the wharf at Point Levis, night had come on, and the city was outlined from citadel to water's edge by twinkling stars of electric light, reflected and multiplied by the ripples of the restless river.

The pre-eminence of Quebec is now a thing of the past, for there is now a low-water channel of 25 feet (soon to be 27 feet) clear up the river to Montreal. Montreal is now beyond question the port of Canada. At the time we lay at Point Levis there was but one solitary barque in the harbour.

LEES AND CLUTTERBUCK.—*B.C.* 1887: *A Ramble in British Columbia.* Longmans.

By permission of Messrs. Longmans.

For a picturesque and fuller account see *A Canadian Tour,* chaps. i. and ii. *Times* Office, 1886.

Quebec

Quebec will always be remarkable for its historical associations, and for the exquisite beauty of its scenery. The traveller, however far he may have rambled, cannot fail to recognise that the view from Durham Terrace is one of the finest he has ever seen. Some contend that it is unsurpassed. On one side is the citadel in all its strength and grandeur. On the opposite bank of the river, Point Levis stands forth with its coves and buildings and scenes of stirring life. Immediately below the majestic river itself flows in a great placid stream on its way to the ocean. To the north rise the bold heights of the Laurentian range. The whole scene furnishes a panorama rarely to be met. In Quebec one feels that one is on a spot where every foot of space was once of value, from the necessity of protecting the whole by works of defence. We are taken back to the European life of insecurity of two centuries ago. Quebec is the one memorial of that condition of things on the American continent. The city itself is built on an eminence which admits of much variety of landscape.

The city of Quebec has long complained that its commerce was languishing, among other causes, from the persistent effects of Montreal to control it. The deepening of the channel between the two cities has accomplished more than was even hoped for by its projectors, for most of the sea-going ships steam past Quebec to find at Montreal the point of transfer for their western freight, and the point where it is most convenient to receive a cargo.

SIR S. FLEMING.—*England and Canada.* Sampson Low.

By permission of Messrs. Sampson Low.

Up the St. Lawrence from Quebec to Lake Ontario

The St. Lawrence flows about 180 miles from Montreal to Quebec, a broad stream through the wide alluvial valley,

QUEBEC.

the mountain cliffs, which guard the river bank at Quebec, and give such boldness to the scenery, receding above the city and thus broadening the plain. The shores become less bold and the adjacent country flattens. On the northern bank is the busy town of Three Rivers. The river St. Maurice comes in here. This river drains a large and important timber-producing region. Its course is marked by rapids and waterfalls. Three Rivers is a great timber-exporting port. The St. Lawrence above this town is broad and monotonous, and ultimately widens out into Lake St. Peter, nine miles wide, and very shallow, except in the ship channel, which has to be kept dredged out. The shores are low, and little is to be seen but the shipping and an occasional timber raft, covering acres of surface and floating lazily with the current. Above the lake, after passing clusters of islands, we come to the chief affluent of the St. Lawrence in this part of its course, the Richelieu, which drains Lakes Champlain and George and all the region southward to the Hudson valley, its navigation being improved by the Richelieu Canal, connecting the St. Lawrence and the Hudson.

Above this frequent villages are passed, that are practically outlying suburbs of Montreal. Among a maze of wooded islands the lower part of the turbid waters of the Ottawa flow in. Parish after parish is passed, each with its church and *presbytère*, with their narrow windows and steep roofs, all covered with strong tin. The villages cluster around the churches, and between them are long stretches of arable land almost unbroken by trees, save where the Lombardy poplar stands up stiffly. The steamer labours against the strong St. Mary current as it comes up to the great city. Montreal lines the western bank of the broad river, its miles of water front superbly faced with long-walled quays of solid masonry and marked by jutting piers, enclosing basins for the protection of shipping. On either hand, at the extremity of the long rank of vessels, up and down the stream, looms up a huge grain elevator. The long line of the great Victoria tubular railway bridge, which brings the Grand Trunk Railway across the St. Lawrence, stands upon its row of limestone piers, and guards the horizon up the river to the south. Behind the broad wharf rise rank after rank of storehouses and stately buildings, and in and beyond these are myriads of domes, spires, and steeples, with the lofty towers of old Notre Dame prominent in front. The grand background to this noble view is made by the mountain that gives Montreal its name.

The St. Lawrence above the city flows 172 miles northeastward from Lake Ontario. Just above Montreal are the Lachine rapids, short, turbulent, and dangerous. The river there broadens into a series of lakes, above which are the Long Sault rapids. Above this the St. Lawrence becomes the boundary between the United States and Canada, and has several flourishing towns on its banks.

At the mouth of Lake Ontario is the famous archipelago known as the Lake of the Thousand Isles, a remarkable formation made by fragments of the range of Laurentian mountains which here comes southward to the river. From Kingston, at the foot of Lake Ontario, the river threads its tortuous passage among the islands to Ogdensburg, some 40 miles below. There are said to be actually 1692 islands, of all imaginable shapes, sizes, and appearances, some several miles long, others only a few yards, and others again barely visible. They vary from gaunt masses of rock to gorgeous foliage-covered gardens. Cluster after cluster of little circular islands is passed, covered with trees, the channel marked by little whitewashed wooden lighthouses.

ANON.—*A Canadian Tour.* *Times* Office.

By permission of the proprietors of the *Times.*

Montreal

It is late in the afternoon before the Indian pilot comes on board for the shooting of the great Lachine rapid. Whirlpools and a storm-lashed sea mingle in this reach, for the shoal water is hurled about among the rocks. The greatest care and precision of skill are necessary, for with lightning speed we rush between two rocks, jagged and cruel. This natural barrier to the water connection between Montreal and the West is overcome by canals running parallel with the rapids.

The Victoria Bridge, a triumph of engineering skill, spans the river above Montreal. It is built of solid blocks of granite, a mile and three-quarters in length; and it is in passing under its noble arches that we get our first view of Montreal, the metropolis of the Dominion.

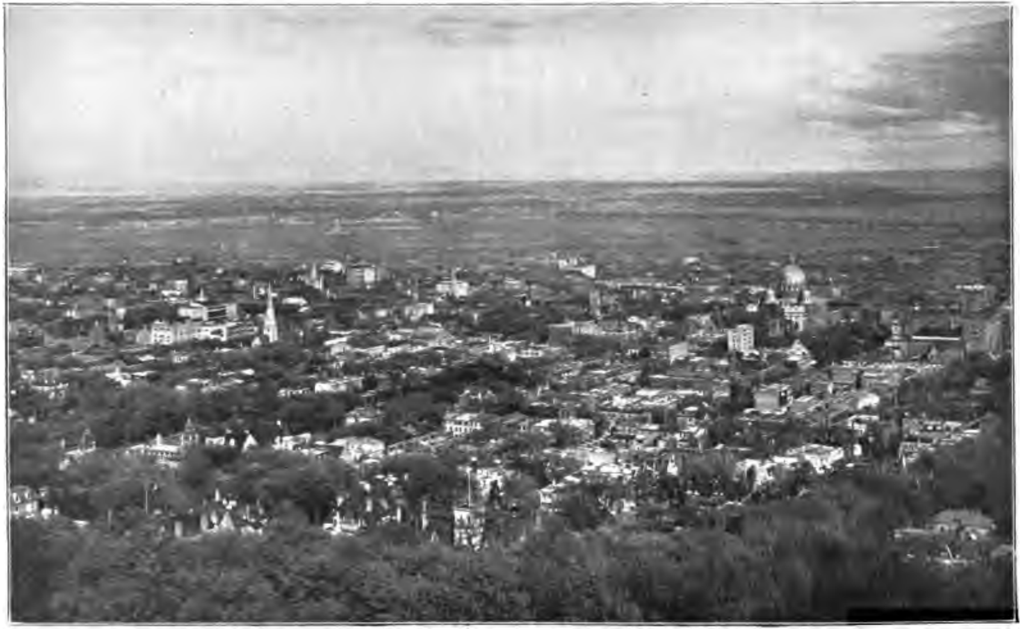
A filmy mist lay over the "City of Spires," spreading up even to the sides of Mount Royal, the wooded mountain that rises abruptly behind the city. The golden dome of the old market of Bonsecours, and the twin spires of the Cathedral of Notre Dame, loomed faintly out from its midst. Before us there is a sea frontage of three miles—vessels of 5000 tons being able to anchor beside the quay.

The French evacuated Montreal 150 years ago, but you might think it was but yesterday. The quaint gabled houses and crooked streets of the lower town, the clattering and gesticulating of the white-capped women marketing in Bonsecours, remind one of a typical Normandy town. Notices are posted in French and English, and municipal and local affairs are transacted in both languages.

LADY VINCENT.—*40,000 Miles over Land and Water.* Sampson Low.
By permission of Messrs. Sampson Low.

The Ottawa River and Chaudière Falls

The great Ottawa River is the most important branch of the St. Lawrence. It is over 700 miles long, is contained entirely within Canada, and drains with its tributaries a basin covering 80,000 to 100,000 square miles, said to be the most productive pine timber region in the world. It is a romantic river, filled with falls and rapids, and has an irregular width, being almost lost in some places in the lakes into which it broadens, whilst in other places the



W. *Notman and Son.*

MONTREAL FROM MOUNT ROYAL.

width contracts to 40 or 50 yards, and the waters are precipitated over the rocks in wild fashion. For about 25 miles above its mouth the Ottawa is from one to six miles wide, and is known as the Lake of the Two Mountains. About six miles above the city of Ottawa begin the rapids, which terminate in the Chaudière Falls at that city, where the water plunges down 40 feet, and where part of it is said to disappear through an underground passage, the outlet of which is unknown. The Ottawa River is navigable for 250 miles, the rapids and falls being avoided by canals. The Rideau River enters at Ottawa, and this is used for the construction of the Rideau Canal, connecting the Dominion capital and the Ottawa valley with Kingston, at the foot of Lake Ontario. The Gatineau River also falls in there, a tributary of great volume, over 400 miles long.

The great boiling cauldron of the Chaudière is the chief natural attraction of the city of Ottawa, and it is as beautiful as it is grand. Owing to the peculiar formation of the rocks, all the waters of the broad river are diverted into a sort of basin about 200 feet wide, down which they plunge with great commotion and showers of spray. The endeavour has been made to sound this curious place, but the line has not found bottom at 300 feet depth. The narrowness of the passage below the falls has allowed a suspension bridge to be thrown across at that place to the suburb of Hull, and this bridge, passing in front of the falls, gives opportunity for an admirable view, wherein the handiwork of nature, with its foaming waters, clouds of spray, and gorgeous rainbows, is flanked by timber piles and saw-mills, which send out gushing streams of water and saw-dust into the river below.

ANON.—*A Canadian Tour.* *Times* Office.

By permission of the proprietors of the *Times.*

Ottawa

Ottawa, the capital of the Dominion, some thirty-five years ago went by the name of Byetown, a Hudson

Bay Company station and a centre for the lumberers. Now at a distance we see the proud towers of the Parliament Houses and Government Building commanding the heights above the river, and we see a town which, though far smaller than Montreal or Toronto, can well challenge comparison in point of picturesque situation. She owes her position as capital to the fact that when all the different provinces of Canada were confederated into one Dominion in 1866 there was too much jealousy between the great cities of Montreal and Toronto for either to be chosen, and so the little Indian town of Ottawa, standing on the confines of Quebec and Ontario, became the centre of government.

As you look down on the enchanting view of the river, from the high terrace outside the Parliament Houses, you see thousands and thousands of huge piles of sawn planks, and when you go down amongst them, you walk through them as through narrow streets of high buildings. By day and night, under the electric light, the huge saw-mills work on, increasing and replenishing these vast stores of wood, which are destined to travel to all parts of the world. It is a wonderful thing to stand in one of these mills, vibrating with the workings of the mighty engines working the huge saws and blades. You see huge forest trees, cut down hundreds of miles away, each marked with its owner's brand, floated down the river, and guided down the rushing water to the special mill to which it belongs. In a moment it is hauled up, dripping, dark, rough, and is under the steel teeth of the huge monster. A crash—a hiss—and in a few moments, after running the gauntlet of one machine after another, the king of the forest emerges from the other end of the shed a pile of commonplace-looking planks.

LADY ABERDEEN.—*Through Canada with a Kodak.* W. H. White and Co.

By permission of Messrs. W. H. White and Co.

Lumbering in Canada

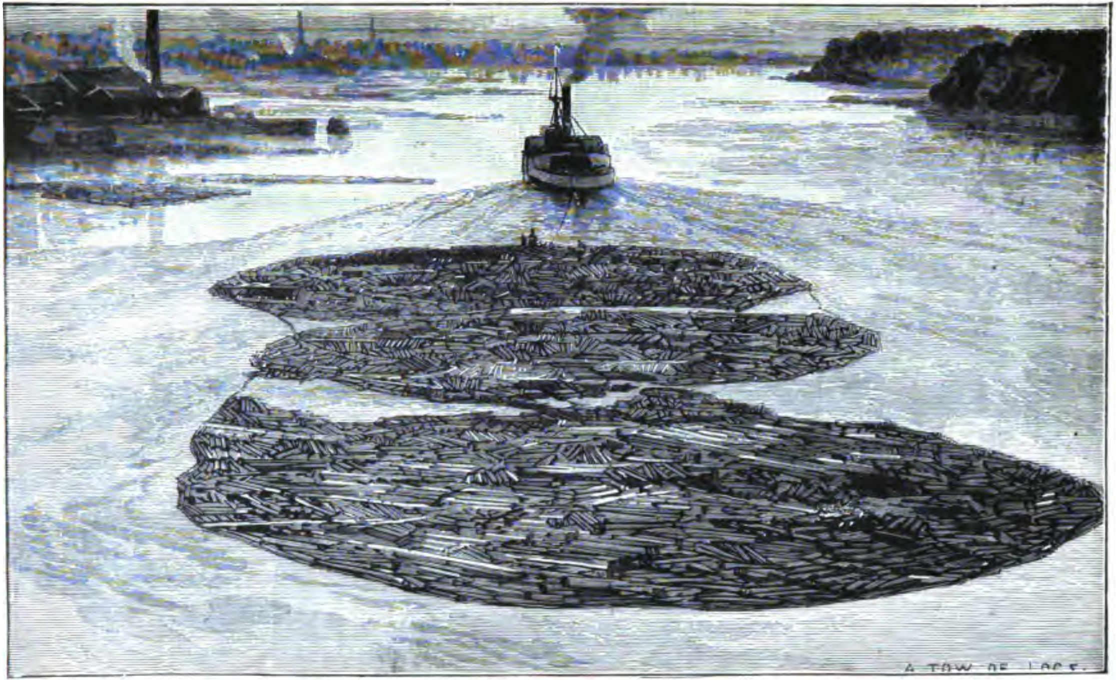
Early in the fall bands of young men start for the shanties from almost every part of Eastern Canada. They are chiefly farmers' sons and farm labourers. In addition, there are the regular shantymen, who spend most of their lives at the business, but they go into the woods earlier to begin operations. During the spring and summer, part of these regular lumber-men work in the saw-mills, while the rest are the famous river-men who bring down the logs from the shanties to the mills. On their way to the shanties the men go by rail as far as possible, and are then driven on big lumber sleighs for miles into the woods. Many of the young farmers bring horses with them and act as teamsters during the winter. In the preceding summer the forest-rangers and the inspector choose a section of the woods for the season's operations, and here the shanty is built. It is a long, low, log building with a roof sloping from front to rear, a great door at one corner, and bunks for fifty men. The bunks are built along one side and end, in a double row, one above the other, like the berths of a steamship. About the middle of the side opposite the bunks is the "caboose," or cooking fire. Here sand is laid over a large patch of the ground, to the depth of a foot, and this is the shanty oven. The smoke escapes through a hole in the roof. The cook first builds a large fire and keeps it going until the sand is red-hot right through. He then rakes off the coals and buries in the burning sand the flat iron kettles in which he bakes his bread, pork, and beans. He covers them up and draws back the coals. Everything is cooked beautifully in this way; the shanty bread is as white and light as that of the best housewife in England. All meals are much alike, and consist of fresh bread, baked pork and beans, molasses, rice, and tea with plenty of sugar.

When the men reach the shanty they are divided by the foreman into four gangs, each with a boss and a special class of work to do. The best men fell the trees and cut them into logs. Another lot drag the logs to a central point for the teamsters, who draw them to the lake or river, while the green hands make roads and clear away brush before the men who are dragging in the logs. Everything moves with the utmost regularity, and an astonishingly large amount of work is done. The logs are all drawn to the nearest lake or stream, where they are piled on the ice, or on the bank if the current be too swift for good ice. The supplies are hauled from the supply depot by men called coasters, each of whom has a team of heavy horses and a large sleigh. They often come 60 or 70 miles through the woods with their loads. Each shanty has a storehouse and a stable for the horses. The men retire very early and are up long before daybreak. The teamsters rise before three o'clock and feed their horses; half an hour later all have breakfast, and by four they are all off to work. About noon they have a cold meal, and at dusk return to the shanty with such appetites as only shanty-men have. Nothing so sharpens the appetite as the long day among the odorous pine, with the smell of the freshly-cut wood, and the hard work in the cold air. There are no more healthy or hardy men to be found anywhere than the lumber-men of Canada.

Were it not for the hard frost and snow, it would be impossible to carry on lumbering operations. The ground and swamps in the forests freeze hard, and then, when they are covered with snow, the lumber-men can go anywhere and haul their logs with ease. But it is not very cold in the forest, for the trees keep off all the winds, and the men never suffer from cold while working.

As soon as the ice on the smaller streams begins to break up in April, the river-men get to work floating the logs down the flooded streams. It is hard work, and men often spend hours wading in the icy water. But the greatest haste is needful, for the water soon subsides, and any logs not down must be left till next season. About the time the smaller streams are clear the ice on the lakes begins to go. The logs are held by a boom till all are in the main river, or usually a lake expansion. When they are all down the men let them drift. A boom is a long chain of logs fastened together end to end by means of short bits of rope or chain, and is used for holding and dragging logs. The men follow the drive, sweeping the river as they go—that is, leaving no logs lying on the shore or in the mouths of creeks, but keeping all moving before them as they work their way slowly down stream. The drives, as they are called, often number 150,000 logs, and quite cover the river for a mile or two. The cook's caboose follows the drive on a large raft, and cooking is done as it drifts along. In the evening the raft is moored at a convenient spot, and the men sit on the grass and eat their meals. They sleep in tents, unless the mosquitoes become too troublesome, when they often push into mid-stream and sleep on the raft.

But it is at the numerous rapids that the river driver finds the excitement and danger of his occupation. Here, as the logs go through, they gradually stick and pile up along the sides until the whole river, except a narrow channel, is blocked. The water is dammed back and rushes through the channel. The men guide the logs with their long pike-poles, and try to keep them running, but a log is sure to stick before long, and those coming swiftly behind pile up and make a jam that closes the channel. The men rush down and try to let off the jam before it gets too big. They work hard, hopping about from log to log with the utmost dexterity, and every moment running risks from which only their skill saves them. Presently the key log is found and worked loose by means of cant-hooks and pike-poles. Then there is a rush of foaming water and tossing logs, over which the men must run or be crushed to death. To the onlooker the task seems impossible, but they dash across whirling logs, balancing themselves like acrobats, leaping hither and thither, never missing their step on the heaving, tossing mass. Every man wears boots whose soles are studded with sharp nails



A TOW OF LOGS.

TOW OF LOGS ON ST. LAWRENCE.

to prevent slipping, but despite this, their skill and coolness are wonderful. To see a man poise himself daintily on a rushing log, moving his feet rapidly to keep on the upper side, then, with a mighty leap, land on an equally unstable footing, and keep his balance while the foam tosses and the water roars about him, is a sight to stir the coldest heart.

As the logs come into the lake they are caught in booms and towed across by a steam tug, and so they move slowly down stream, taking the whole summer for their journey, and reaching the mill usually about the end of August or first of September. The saw-mills are built on the bank of the river, at some point where there is a good railway or steamship connection.

Ottawa, the Dominion capital, is the chief of these lumber centres. During the summer a saw-mill presents a scene of the liveliest activity. At night electric lights are called into service, and so night and day the busy hum of the saws is heard. The logs are hauled up from the river by endless chain carriers, placed on moving carriages, and cut into lumber by the lightning band-saw and the gang-saws, which cut up half a dozen logs at once. Thence machinery carries the boards to the edges to be trimmed, and outside slabs to the wood-pile to dry for firewood, and the saw-dust and small bits to the great furnace which burns all refuse. As the boards move on their carriers, a man stands by, who swiftly measures and marks them. Outside they are sorted and stacked in piles ready for shipment.

The Ottawa is the most important lumber river in Canada, with the St. John second. In the former flow half a dozen large rivers, each bringing down its two or three drives every year. In addition to the rough logs for the mills, a great deal of square timber for England comes down the Ottawa. The timber is fastened together in cribs, and a great number of these cribs are joined to form a raft, which often covers an extent of an acre or more. The men have a little hut on the raft, and live there.

When falls or rapids are reached, the timber must go through a slide just wide enough to receive a crib, so the raft is broken up, sent through one crib at a time, and put together again below. The water rushes through the slide very swiftly, and a trip down on a crib is a most exciting experience. At the bottom it shoots into the river with a plunge which buries half its length in the water for a moment. The rafts go slowly down the Ottawa until they join the St. Lawrence above Montreal, then down the St. Lawrence to Quebec, where the timber is loaded on ships for England.

In British Columbia also, lumbering is an important occupation, for the Douglas firs, which grow to an immense size, and the cedars make capital lumber. The Douglas firs are hardly equalled anywhere else in size. They often reach a height of 300 feet, with a girth of 50 or 60.

The forests of British Columbia lie along the coast, and are very extensive. The Douglas fir and the cedar are the most important trees for lumber, but there are several other varieties as well.

E. R. PEACOCK.—*Canada.*

By permission of the High Commissioner for Canada.

Contrast this with the account of mahogany cutting, *Descriptive Geography of South America.*

Farming in Canada

The farmers of Eastern Canada devote a great deal of attention to dairy-farming; in fact, many of them have given up almost entirely the growing of grain except for fodder. In the west also more attention is paid to dairying each succeeding year, with good results. Cheese and butter factories are built throughout the country, in the east, at very short intervals, and to these almost every farmer sends his milk. A favourite plan is to have two sets of machinery, and to make cheese during the summer and butter during the winter. The cheese industry is one of the most important, and is growing with great rapidity.

Nearly all the cheese is shipped to Britain, in whose markets it is a favourite on account of its good quality. The export of butter on a large scale began later, and the volume of trade is not nearly so large as that of cheese, but it is overtaking its rival. On every farm there are flocks of poultry. The eggs are gathered up regularly by buyers, who drive through the country and call at each house once or twice a fortnight during the summer. A short time before Christmas the turkeys, geese, and other fowl that have been fattening are killed, dressed, and taken to what is called the "turkey fair." Here they are bought by dealers, who ship them to the various markets for the Christmas trade. So important is this trade considered that in some particularly suitable localities, such as Prince Edward Island, the Government has established poultry-fattening stations as examples to the farmers in methods of feeding.

Except in the ranching country, the western farmers devote their energies mainly to wheat-growing. When the threshing and marketing of the crop are over in the fall, ploughing begins and goes on steadily until stopped by the frost in November or December. In April the land is seeded with wheat, after which the ploughing is completed, and the oats and other crops put in. Then the farmer waits for the harvest, busying himself meantime with his dairy cattle, and the cultivating of the potatoes and other roots, or in breaking up fresh prairie land. In July the hay is cut, dried in the sun, and stored in the barns or in stacks. If many cattle are kept, the green Indian corn is cut and stored, to be pressed and used as winter food for the milch cows. As the wheat begins to head out, the western farmer casts many an anxious glance at the weather probabilities, for occasionally a late night-frost comes at this season and damages his crop. In August the wheat is ripe and the harvest begins. The grain is rapidly cut and bound into sheaves by machines called binders. In the east it is stored in barns to be threshed later, but the crop is too large for this in the west, so it is hauled to a stack and piled ready for the threshers. Just before cutting, the western wheat-fields present a lovely picture. As far as the eye can reach, the grain waves and ripples to the warm summer breeze like a sea of gold.

As soon as the grain has been cut and stacked, comes the threshing—a most important part of the work. In the west people live far apart, so a threshing gang goes with the mill. They sleep in a large conveyance somewhat like a car, which is drawn from place to place by the traction engine, which draws the threshing machine and supplies the driving power when the mill is at work. As the hum of the threshing mill begins the scene is a lively one and worth watching. Every man has his appointed place, and the stack of grain grows rapidly smaller as the pile of straw heaps up and the bags are filled with bright clean grain. As soon as threshing is over, the farmer hauls his grain to the nearest railway station, where it is sold and stored in the elevator ready for shipment to the east over the Canadian Pacific Railway.

E. R. Peacock.—*Canada.*

By permission of the High Commissioner for Canada.

The Habitants of Canada

Frenchmen were the first settlers in Canada, and the Province of Quebec is still nearly all French. The farmers are called *habitants*, and live in a very quiet, simple way. They are cheerful, full of innocent fun, and make good citizens. The habitants have very large families; indeed, a family of twenty-four is not uncommon. Some years ago the Quebec Government offered a hundred acres of land in the unsettled part of the province to every farmer who had twelve living children, and the number of habitants who came forward to claim the reward quite astonished those who had passed the law.

The habitant is quite a picturesque fellow as he rides along the road in his French cart on a hot summer day, and he is even more so in winter, when he wears a dress that is distinctively his own. He is clad in thick trousers of gray homespun, and a coat of the same material, with a capuchin or hood, which can be drawn over the head when driving in cold or stormy weather. About his middle is wound a long scarlet sash, tied so that the tasselled ends hang loose at the side. On his head is a knitted capote of some brilliant colour with a tassel, and on his feet "beef-skin" moccasins with long leather tops that come nearly to the knee. Both the summer and winter vehicles used are peculiar.

The cart is a high two-wheeled gig, usually without springs, and with a seat that will accomodate two persons. The sleigh used in winter is called a "burlo," and is very low, with a high back, and a dash-board to stop the snow that flies from the horse's feet as he trots. The horses are sturdy little animals, short and thick-set. They are a breed that has been developed in Quebec, will stand much hard work without exhaustion, and are known as French Canadian ponies.

The habitants retain many of the picturesque customs and ceremonies of the early French settlers. They are fond of meeting together for enjoyment, and will go long distances to attend the dances which are frequently held. The fun goes on from early evening till four or five o'clock in the morning, growing ever more lively as the night wears away. These dances are still conducted as they were a hundred years ago—the "fiddler" sits on a high seat and "calls of" the various movements as he plays, while the dancers go through the figures and step dances of their great-grandfathers.

After the midnight mass on Christmas Eve, which every one attends, several families usually gather at some farm-house for a big supper, at which one may hear many an old French chanson and see some of the quaint customs of long ago. These people cling to their language also, and their love for the past is shown in the fact that they do not speak modern French, but the language of last century, with only such changes as life in an English-speaking country has caused. According to the law of Canada, French and English are both recognised, and both are used in Parliament. The English of the French Canadian is a peculiar patois helped out by violent gesticulations.

The habitant is singularly independent of many things which to most people are absolutely necessary. He grows his own tobacco, and makes much of his sugar from the sap of the maple. From his sheep he gets wool, which his wife spins and weaves into the strong "homespun" cloth of which his clothes are made. Very often he makes his own whisky also, and a great deal of the habitants' whisky-blanc is used throughout Quebec.

E. R. PEACOCK.—*Canada.*

By permission of the High Commissioner for Canada.

Forest Fires of Canada

Forest fires are natural phenomena, being mostly due to lightning in the summer-time, and they have no doubt been going on from time immemorial. Lightning is of frequent occurrence during the hot, dry season in all parts of Canada.

Let us imagine ourselves in an old forest of this region, of practically unlimited extent, and consisting of a dense growth of black and white spruce, Banksian pine, tamarack, and balsam fir. The smaller trees fill up the spaces between the larger ones, and all are crowded so closely together that their branches touch or intermingle with each other. In this way a sufficiently dense mass of fuel is formed to support a continuous sheet of flame on a grand scale, and yet it is sufficiently open to furnish a plentiful supply of air to carry on the conflagration. The ground is deeply covered with moss, and an accumulation of fallen trees and branches is lying about in all directions. After the prolonged hot weather and drought of the summer months the moisture has become thoroughly dried out of the gummy boughs of the standing trees, leaving their great store of resin and turpentine, as well as the wood itself, all ready for burning. The mossy carpet and the fallen timber are alike dry. All the conditions are now ready, and only await a spark of fire to start one of the wildest and grandest scenes of destruction which can take place on the face of the earth.

When the fire has got under way, the pitchy trees burn with almost explosive rapidity. The flames rush through their branches and high above their tops with a terrifying sound. The ascending heat soon develops a strong breeze, if a wind does not happen to be blowing already. Before this gale the fire sweeps on with a roaring noise as fast as a horse can gallop.

The irresistible front of flame devours the forest before it as rapidly as a prairie fire licks up the dry grass. The line of the gigantic conflagration has a height of 100 feet or more above the tree-tops, or 200 feet from the ground. Great sheets of flame disconnect themselves from the fiery avalanche and leap upwards as towering tongues of fire, or dart forward, bridging over wide spaces, such as lakes and rivers, and starting the fire afresh in advance of the main column, as if impatient of the slower progress it is making. These immense shooting flames are probably due to the large quantities of highly inflammable gas evolved by the heat from the pitchy tree-tops just in advance of actual combustion, and they help to account for the incredible speed of most of the larger forest fires.

The wild animals appear to understand the significance of the roaring noise and the clouds of smoke in the sky in advance of these conflagrations. The terrified deer, bears, wolves, foxes, lynxes, and hares flee for their lives, followed by multitudes of the small fur-bearing animals; but as a rule all are soon overtaken and destroyed. Should any of the larger beasts be fortunate enough to reach a lake or river in time, they may escape along with the beavers, musk-rats, otters, and minks, which seldom stray far from the water. The birds fly up into the air in confusion, in advance of the wall of fire, and appear to become stifled by the heat and the smoke, and after fluttering about for a few minutes they fall into the flames and perish.

These great fires come to an end in different ways. It may be by a change in the wind, followed by a deluge of rain, or by coming to a wide extent of previously burnt country, or of small deciduous trees, or to a chain of large lakes.

The dead trunks of the larger trees generally stand for many years after the fire. In the summer following one of these conflagrations, the blackened ground becomes partly covered by a growth of herbaceous plants, berry-bushes, and shoots from the roots and butts of deciduous trees which have retained some vitality, besides numerous small seedling trees. The huckleberry bushes, which are very common for the first few years, especially on rocky, siliceous ground, bear abundant crops of fruit. They have sprung from large old roots, which are almost everywhere present in the thick woods, although their tops are quite inconspicuous, and bear few or no berries. In fifteen or twenty years the ground is covered with poplars, birches, willows, etc., to a height of about thirty feet. By this time the dead trunks of the old *brulé* have lost most of their branches, and the smaller ones have fallen down. If we look under this growth, we shall discover many healthy young conifers overshadowed by the more rapidly growing deciduous trees. At the end of about fifty years the conifers are everywhere showing their heads, in the form of sharp apices, their dark green colour contrasting strongly with the lighter shades of the other trees. In the race to get above the deciduous growth, they develop tall trunks with the branches high up. In one hundred years the poplars are dying and falling down, and the canoe birch has attained maturity and soon after shows signs of old age. Meantime the older conifers have overtopped the other trees and given a new character to the general appearance of the forest. The younger conifers of various ages, which have been springing up from seed every year, take possession of the ground left by the decay of the first occupants, and in about one hundred and fifty years the forest has again become almost entirely coniferous, and is ready to be destroyed once more by fire. Such is the rotation of crops of trees which is perpetually going on in these regions.

DR. R. BELL.—*Scottish Geographical Magazine.* June 1897.

By permission of the Royal Scottish Geographical Society.

The Province of Ontario and the Niagara Peninsula

Of the provinces Ontario is by far the greatest and wealthiest. Bounded by three great lakes, Ontario, Erie, and Huron, and by three great rivers, the St. Lawrence, Detroit, and Ottawa, so that its position, though in the middle of the continent, is almost insular; equipped with a most complete railway system; having a climate which favours the growth in abundance of grapes, peaches, melons, maize, and similar products in the south, and is singularly suited for wheat, barley, and all the hardier cereals further north; with petroleum and salt areas in the west, timber areas on Lake Huron, mineral deposits of great variety and extent on Lake Superior, the province seems almost unique in situation and resources for production and commerce of all kinds.

Speaking generally, agricultural employment and products in Ontario are not unlike those of the United Kingdom; a warmer summer and drier autumn giving, in comparison, advantages in ripening fruit and harvesting grain; a colder winter presenting drawbacks in the feeding of stock and for outdoor farm work.

A visit to the Niagara peninsula of Ontario upsets many preconceived ideas about the Canadian climate. It is the greatest fruit district of the Dominion. Grapes, peaches, melons, and tomatoes are raised in the greatest profusion in the open air. As a consequence, the markets of all the principal towns of Eastern Canada are in the season supplied with fruit in extraordinary abundance, and at a price which makes it part of the ordinary diet of the poor.

The fruit-growing industry of the Niagara district is already important, but a steadily widening market seems likely to give it a great expansion. Few parts of Canada illustrate more fully the advantage which has come from the extension of the railway system of the Dominion. Many hundreds of tons of grapes, pears, tomatoes, etc., are shipped yearly from the country between Hamilton and Niagara to Winnipeg, whence they are distributed as far west as the Rocky Mountains. Eastward a market is found as far as Prince Edward Island and Nova Scotia, the latter of which, though an excellent apple region, does not favour the growth of grapes and peaches. Special fruit-trains are run regularly during the autumn to Toronto and Montreal, and fruit transport forms at this season an important item in the receipts of the Grand Trunk and other lines. The export of apples from Ontario to Britain is very large.

Ontario supplies much the larger proportion of the cheese and live cattle which the Dominion sends to England, and now aims at increasing its output of butter, especially during the winter, in alternation with the cheese-making of the summer.

SIR G. PARKIN.—*The Great Dominion.* Macmillan and Co.

By permission of Messrs. Macmillan and Co.

Canada in the Height of Summer

Ninety-five degrees in the shade! All day Lake Ontario lay like a sheet of blinding blue radiance, against which the little boats stood out in silhouette so sharp as almost to hurt the eye; the sands on the shore sparkled like grains of gold, the path of sunlight that pointed across the dancing ripples was one dazzle of diamonds. All day the sky was without a fleck of cloud, and the sun's fierce rays fell like flame on whatever they touched.

We were inveigled, by the promise of a breeze and a peach-orchard, into taking a drive which, whether it was long or short, appeared interminable. Neither white umbrellas, green veils, nor puggarees were of any avail against the piercing sun. As for shade, even in the peach-orchard we could only find little patches of shadow immediately under the trees.

The orchard stretched away for acres and acres; for aught we could tell, it might have been for miles and miles. The great trees bowed down, overburdened with their fragrant load. Each branch bore a wealth of glowing fruit. Peaches, unripe and overripe, bestrewed the ground; we trod them down in the long, rank grass; they lay scattered round in barbaric luxuriance. The owner of the orchard broke off large boughs, bending under their weight of golden-rosy and rosy-purple fruit. The peaches as we touched them were burning with the sun-glare, and warm to the luscious core.

We lingered in this idyllic orchard, snatching such shelter as we could find, in the scant shadow round the trees, from the sun at its merciless zenith, dreading to face the return drive along the glaring white, dusty road, back to the lake.

The sun sloped westwards; the shadows lengthened, and with evening came a singular change, not in the temperature, but in the atmosphere. A strange, lurid, dun colour overspread the heavens; a terrible stillness seemed to brood over the earth; not a leaf rustled nor a bird chirruped; and the lurid haze, deepening as dusk drew on, shed a coppery-yellow tinge over the whole landscape. The day is still remembered there as the yellow day. We heard the curious effect attributed to distant forest fires.

LADY DUFFUS HARDY.—*Between Two Oceans*. Hurst and Blackett.

By permission of Messrs. Hurst and Blackett.

The Soo

In due course we arrived at Sault Ste. Marie, now pretty commonly alluded to as "the Soo." Here is the junction between the two great lakes, and as there is a considerable difference in their levels, a lock has been constructed which is said to be the largest in the world, and is certainly a very fine specimen of what modern engineering can do. One way and another it took about an hour to get the *Alberta* through the lock, and we amused ourselves on land during this period of inaction. The great sport of the locality seemed to be running the rapids in canoes.

Close to the lock the fishermen who make their living here have built some ponds in the bed of the river, letting the water run through; and here they stir up with long poles for your benefit divers monsters of the deep, sturgeons, white fish, and lake trout being the varieties we noticed.

LEES and CLUTTERBUCK.—*B.C.*, 1887. Longmans.
By permission of Messrs. Longmans.

Niagara Falls

Next morning, about six, we passed through Buffalo, and with only the glimpse of a distant flash of white foam, which may or may not have been the Falls, steamed into Niagara station, and thence drove across the suspension bridge to the Canadian side, putting up at Clifton, which has a superb view of both the American and Horse-Shoe cataracts. Of these hundreds of descriptions have been written. From them and from photographs of the Falls, and especially from the moving pictures, one may get a rough idea of what they are like. We learn that there are practically two distinct falls, with a full quarter-mile of island between them, and that the American is a few feet higher than the Canadian, or Horse-Shoe. Guide-books tell you that the St. Lawrence is a mile wide at the place where it makes its great leap of 160 odd feet. Ruskin describes the rush of water at the rounded brink of the precipice as "sheer polished velocity," yet no descriptions quite prepared me for what I saw.

The American Fall is very graceful. The water is a pale brownish-green only for the first six or eight feet down; it then becomes broken into spray, and remains snow-white for the rest of its descent. From its base long rolling clouds of mist are blown out over the water, and rise, but soon melt into the air, and seldom ascend to the level of the brink. One cannot possibly criticise so calmly the vision which meets the eyes if they turn farther to the west, past the dry, ruddy face of the precipices beneath the dark trees of Goat Island. There, on the left, nearly a mile away, the sunshine kindles to transcendent whiteness a curved cliff of foam; and from just behind it bursts forth cloud after cloud of spray as though fired from a thousand guns, now rolling up billow on billow, now in countless spear-points of water turning at once to the finest mist—a mist which floats across the gorge, and rises broad and triumphant, decked with snow-white plumes and feather sprays, until, a mass of silver cloud, it drifts away across the summer sky. Just above this cloud of foam the great body of the river's water comes over in one massive, unbroken liquid wall of clearest emerald, fretted and flecked with falling crescents of foam, coruscating and scintillating in the sunshine. Here and there, on the arch of the water, flash, for an instant, drawn-out reflections of the sun-like glittering threads of fire; but it is impossible for any one to put into words the look of irresistible power, of overwhelming strength and crushing weight, of that translucent mass of crystal. The thunder of the conflict shakes the land for a long distance round, and for 300 feet or more from the bottom of this fall, the broad surface of the river is one seething and hissing mass of foam, tossed with waves hurrying from side to side.

Strikingly grand as Niagara is under bright sunshine, it is still more impressive at sunset and by moonlight. To take the evening of Tuesday, August 10, for instance, we were then looking at the American Fall from the west. Near the horizon lay a bank of heavy cumulus thunder-clouds glowing in the orange and scarlet of sunset against a sky of pale saffron, piled up one above another, like range upon range of very lofty rounded snow-peaks. Filmy, salmon-coloured stratus, in long level lines, cut the upper slopes of these cloud mountains; whilst below them and nearer lay another range of weird dark-purple clouds, contrasting wonderfully with the gorgeous hues of the distant giant range. Sharp against the inky horizon leapt and tumbled the amber breakers of the rapids, flanked with deep warm green of the foliage on Luna and Goat Islands, the smoother patches of water reflecting the pale blue of the sky nearer the zenith. The tresses of the fall itself were all palest cream, losing themselves in the glowing heart of the half transparent foam-wreaths slowly curling up from depths already growing dark in the shadow of the cliffs. And who shall describe the wonders of the Horse-Shoe Fall at this solemn hour? Who shall

A BIRD'S-EYE VIEW OF NIAGARA RIVER.

(Showing the broad, quiet upper course, the cataract and the gorge below).

paint the subtle shades of the huge pillar of rosy mist ever rising to the sky, or the magic of the clean-cut sheets of emerald descending close beside this hazy, opal tower?

That night, about eleven o'clock, from Table Rock, which juts out over the waters, I saw the Horse-Shoe Fall by the brilliant full moon, which then stood over the rapids above the cataract, so that the part of the water above the centre of great curve was in shadow, whilst to right and left the shadow fell obliquely on the waters in their descent. Palest gray are they, except just where they curve over; there, furrowed streaks of molten silver form the highest lights in all the picture. Only the thunder of the falling waters, even louder now than by day, betray that they are real, so visionary and ethereal do they look. Dark and impenetrable, the serrated woods on either shore guard the boundaries of the endless race of eager waters, and over all the stars are glittering, set in the high arch of night.

T. C. PORTER.—*Impressions of America.* Pearson.

By permission of Mr. T. C. Porter and Messrs. C. Arthur Pearson.

From Lake Superior to Banff by the C.P.R.

Our journey to the Far West, through golden wheat, begins at Fort William; from there the Canadian Pacific takes us across to the ocean. From Fort William we passed through a wild rocky country, following the Kaministiquia. Night closes in on this lonely country. In the cold early morning we reach Rat Portage, at the outlet of the beautiful Lake of the Woods. We are still travelling through the same rock-bound country, ungainly masses of rock protruding through a scrub growth of dwarf trees. This is succeeded by a run through some "muskeg," or black peaty bog land, where flourish rank grasses against a background of bushy poplar trees.

Thirty or forty miles from Winnipeg the country opens out, and gradually assumes a prairie character. The land is quite flat now, covered with coarse yellow grass, and sprinkled with wild flowers. There are great patches of gorgeous wild sunflowers, masses of purple and white Michaelmas daisies, bluebells, lupins, marsh mallows, cyclamen, and acres of golden-rod. As we pass out of Winnipeg station we see the enormous plant and rolling-stock of the C.P.R., which has here its half-way depôt between Montreal and Vancouver. They have twenty miles of sidings, now full of plant waiting to be pressed forward to bring down the harvest to the coast. We could not have chosen a more favourable moment for visiting the North-West, as the harvest is in full swing. We are passing through a sea of golden grain, acre after acre extending in an unbroken line to the horizon.

For over 400 miles, from Regina to Medicine Hat, a vast steppe extends. There is no green thing on it, but it is covered with coarse grass, burnt to a sere yellow. The prairie is trackless as a desert; lonely as the ocean; vast and colourless as a summer sky. The atmosphere is so clear that the blades of grass stand out alone, and a distant sage-bush is intensely blue. The only variety is found in the great saline lakes we frequently pass.

After leaving Medicine Hat we ascended the valley above the South Saskatchewan, and passed on to a more fertile prairie.

Calgary is the capital of Alberta, and the centre of a great ranche country. It does not lie under the Rockies, but 50 miles away.

We are soon well into the foot-hills, those grassy rounded slopes, which are the first rising ground from off the prairie, and which lead up to and end in the Rocky Mountains. The great amphitheatre of mountains is beginning to impress us with its barren, purple scars; and just as we are entering them our guard stops the train, and takes us out to see the Kananaskis Falls in the Bow River.

We are now breaking through the outer barrier of the Rockies, and penetrating deeper into the mountains. They rise up on every side as we wander through the green valley by the side of the Bow River, our travelling companion for many days to come. It is curious to notice the difference between the two ranges we are passing through. Those to the left are fantastically broken into varied shapes and forms penetrated by crevasses, full of deep-blue and purple-red shadows. The range on the right is formed of gray and white hoary-headed peaks, and looks brilliantly cold and white in the strong sunlight.

We approach the Cascade Mountain. It entirely blocks our further progress, and the train seems to be going to travel up it. We appear to touch it, but in reality it is many miles away. Another half hour, and we reach Banff.

LADY VINCENT.—*Newfoundland to Cochin China.* Sampson Low.
By permission of Messrs. Sampson Low.

The Red River of the North

The Red River—let us trace it while we wait the coming captain who is to navigate us down its tortuous channel. Close to the Lake Ithaska, in which the great Mississippi River takes its rise, there is a small sheet of water known as Elbow Lake. Here, at an elevation of 1689 feet above the sea-level, 9 feet higher than the source of the Mississippi, the Red River has its birth. It is curious that the primary direction of both rivers should be in courses diametrically opposite to their after lines, the Mississippi first running to the north, and the Red River first bending toward the south ; in fact, it is only when it gets down here, near the Breckenridge Prairies, that it finally determines to seek a northern outlet to the ocean. Meeting the current of the Bois-des-Sioux, which has its source in Lac Travers, in which the Minnesota River, a tributary of the Mississippi, also takes its rise, the Red River hurries on into the level prairie and soon commences its immense windings. This Lac Travers discharges in wet seasons north and south, and is the only sheet of water on the continent which sheds its waters into the tropics of the Gulf of Mexico and into the polar ocean of the Hudson Bay. In former times the whole system of rivers bore the name of the great Dakota nation; the Sioux River and the title of Red River were only borne by that portion of the stream which flows from Red Lake to the forks of the Assiniboine. Now, however, the whole stream, from its source in Elbow Lake to its estuary in Lake Winnipeg, fully 900 miles of water, is called the Red River. People say that the name is derived from a bloody Indian battle which once took place upon its banks, tinging the waters with crimson dye. It certainly cannot be called red from the hue of the water, which is of a dirty-white colour. Flowing towards the north with innumerable twists and sudden turnings, the Red River divides the State of Minnesota, which it has upon its right, from the great territory of Dakota, receiving from each side many tributary streams which take their source in the Leaf Hills of Minnesota and in the Coteau of the Missouri. Its tributaries from the east flow through dense forests; those from the west wind through the vast sandy wastes of the Dakota Prairie, where trees are almost unknown. The plain through which the Red River flows is fertile beyond description.

At a little distance it looks one vast level plain through which the windings of the river are marked by a dark line of woods fringing the whole length of the stream. Each tributary has also its line of forest — a line visible many miles away over the great sea of grass. As one travels on, there rise first above the prairie the summits of the trees; these gradually grow larger, until finally, after many hours, the river is reached. Nothing else breaks the uniform level. Standing upon the ground the eye ranges over many miles of grass; standing on a waggon, one doubles the area of vision; and to look over the plains from an elevation of twelve feet above the earth is to survey at a glance a space so vast that distance alone seems to bound its limits. The effect of sunset over these oceans of verdure is very beautiful—a thousand hues spread themselves upon the grassy plains; a thousand tints of gold are cast along the heavens, and the two oceans of the sky and of the earth intermingle in one great blaze of glory at the very gates of the setting sun.

SIR W. F. BUTLER.—*The Great Lone Land.* Sampson Low.
By permission of Messrs. Sampson Low.

The Forks of the Saskatchewan

Two hundred and fifty feet above water-level, the narrow tongue of land rises over the junction of the two Saskatchewan rivers.

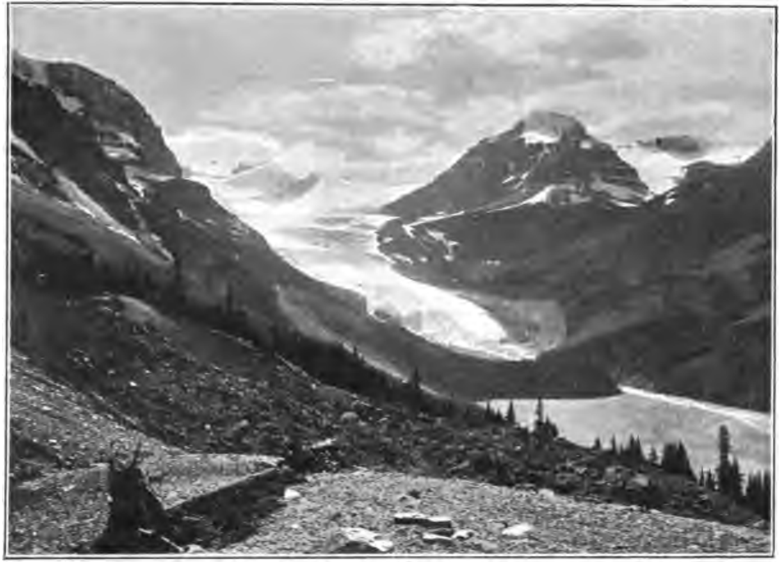
Bare and level at top, its scraped front descends like a wall to the rivers; but landslip and the wear of time have carried down to a low level the loose sand and earth of the plateau, and thickly clustering along the northern face, pines, birch, and poplar shroud the steep descent. It is difficult to imagine a wilder scene than that which lay beneath this projecting point.

From north-west and from south-west two broad rivers roll their waters into one common channel, two rivers deep furrowed below the prairie level, curving in great bends through tree-fringed valleys.

One river has travelled through 800 miles of rich rolling landscape; the other has run its course of 900 through waste and arid solitudes; both have had their sources in mountain summits where the avalanche thundered forth to solitude the tidings of their birth. And here at this point, like two lives, which, coming from a distance, are drawn together by some mysterious sympathy and blended into one, are henceforth to know only the final separation, these rivers roll their currents into one majestic stream, which, sinking into a deep gorge, sweeps eastward through unbroken pine forest.

Standing at this junction of the two Saskatchewan rivers, the traveller sees to the north and east the dark ranks of the great sub-Arctic forest, while to the south and west begin the endless prairies of the middle continent.

SIR W. F. BUTLER.—*The Wild North Land.* Sampson Low.
By permission of Messrs. Sampson Low.



From *The Rockies of Canada*, by W. D. Wilcox.

SOURCE OF THE SASKATCHEWAN.

From Banff to the Pacific

Resuming our journey, we are soon reminded by the increasing nearness of the fields of snow and ice on the mountain slopes that we are reaching a great elevation, and two hours from Banff our train stops at a little station. We are told that this is the summit of the Rocky Mountains, just a mile above the sea.

Two little streams begin here, almost from a common source. The waters of one find their way down to the Saskatchewan and into Hudson's Bay, and the other joins the flood which the Columbia pours into the Pacific Ocean. Passing three emerald lakes, deep set in the mountains, we follow the west-bound stream down a tortuous rock-ribbed cañon, where the waters are dashed to foam in incessant leaps and whirls. This is the Wapta, or Kicking-Horse Pass. Ten miles below the summit we round the base of Mount Stephen, rising directly from the railway to a height of more than 8000 feet. From the railway, clinging to the mountain side, we look down upon the river valley, which, suddenly widening, here spreads between the pine-clad mountains a mirror-like sheet of water, reflecting each peak and precipice.

Still following the river, now crossing deep ravines, now piercing projecting rocky spurs, now gliding through level park-like expanses of greensward, with beautiful trees, lakelets, and brooks, with here and there a saw-mill or a slate-quarry, we soon enter a tremendous gorge, whose frowning walls, thousands of feet high, overhang the boiling stream which roars at their base, and this we follow for miles, half shut in from the daylight. Two hours from the summit, and 3000 feet below it, the gorge suddenly expands, and we see before us, high up against the sky, a jagged line of snowy peaks of new forms and colours. A deep, wide, forest-covered valley intervenes, holding a broad and rapid river. This is the Columbia. The mountains before us are the Selkirks, and we have now crossed the Rockies. Sweeping round into the Columbia valley, we have a glorious mountain view. To the north and south, far as eye can reach, we have the Rockies on one hand, and the Selkirks on the other, widely differing in aspect, but each indescribably grand.

Crossing the Columbia, and following it down through a great cañon, we shortly enter the Beaver valley, and commence the ascent of the Selkirks. For 20 miles we climb along the mountain sides, through dense forests of enormous trees, until, near the summit, we find ourselves in the midst of a wonderful group of peaks of fantastic shapes and many colours. At the summit, 4500 feet above tide-water, is a broad level area, surrounded by mountain monarchs. To the north is a great glacier, whose clear green fissures we can plainly see. To the south is another vastly larger, by the side of which the greatest of those of the Alps would be insignificant. Smaller glaciers find lodgment on all the mountain slopes, whence innumerable cascades come leaping down.

Descending westerly from the summit, we reach in a few minutes the Glacier Hotel, at the foot of the grandest of all the peaks in the Selkirks—Sir Donald—an acute pyramid of naked rock, shooting up nearly 8000 feet above us. In the valley far below we see the glacier-fed Illicilliwaet, glistening through the tree-tops, and beyond the mountains rise in immensity and majesty beyond all comparison. To reach the valley the engineers wound the railway in a series of great curves or loops all about the mountain slopes, and as we move on this marvellous scene is presented in every aspect. We plunge again for hours through precipitous gorges, deep and dark, and again cross the Columbia, which has made a great detour round the Selkirks, while we have come directly through them. The river is deeper and wider here, and navigated by steamboats for nearly 200 miles. On its east bank stands Revelstoke, the supply point for the mining districts up and down the river, and here are large works for smelting silver ores, which are brought from the mines by the railway and steamboats.

We are now confronted by the Gold Range, another snow-clad series of mountains, but broken directly across, and offering no obstacle to the railway. The deep and narrow pass through this range takes us for 40 miles or more between parallel lines of almost vertical cliffs, into the face of which the railway is frequently crowded by deep black lakes, and all the way the bottom of the valley is thickly set with trees of many varieties and astonishing size.

A sudden flash of light indicates that we have emerged from the pass, and we see stretching away before us the Shuswap Lakes, whose crystal waters are hemmed and broken in every way by abruptly rising mountains. After playing hide-and-seek with these lovely lakes for an hour or two, the valley of the South Thompson River is reached, a wide, almost treeless valley, already occupied from end to end by farms and cattle ranches. Then comes Kamloops, the principal town in the interior of British Columbia, and just beyond we follow for an hour the shore of Kamloops Lake, shooting through tunnel after tunnel. Then the valley shuts in, and the scarred and rugged mountains frown upon us again, and for hours we wind along their sides, looking down upon a tumbling river. We cross the deep black gorge of the Fraser River on a massive bridge of steel, seemingly constructed in mid-air, and enter the famous cañon of the Fraser.

The view here changes from the grand to the terrible. Through this gorge, so deep and narrow in many places that the rays of the sun hardly enter it, the black, ferocious waters of the great river force their way. We are in the heart of the Cascade range, and above the walls of the cañon we occasionally see the mountain peaks gleaming against the sky. Hundreds of feet above the river is the railway, notched into the face of the cliffs, now and then crossing a great chasm by a tall viaduct, or disappearing in a tunnel through a projecting spur of rock. For hours we are deafened by the roar of the waters below. The scene is fascinating in its terror, and we finally leave it gladly, yet regretfully.

At Gale the cañon ends and the river widens out, but we have mountains yet in plenty. We see Chinamen washing gold on the sandbars, and Indians herding cattle in the meadows. Salmon drying on poles near the river gives brilliant touches of colour to the landscape.

A gleaming white cone rises to the south-east. It is Mount Baker, 60 miles away and 14,000 feet above us. We cross large rivers flowing into the Fraser. The valley widens out. Farms and orchards become more and more frequent. Touching the Fraser River now and then, we see an occasional steamboat, and here in the lower part the water is dotted with Indian canoes, all engaged in catching salmon.

At Mission a branch line turns off to the south, crossing the Fraser River immediately, and connecting at the international boundary with railways extending along Puget Sound to Seattle, Tacoma, Portland, and San Francisco, and all the way to the Gulf of California, passing those glorious isolated peaks that stud the Pacific coast, Baker, Tacoma, Hood, and Shasta.

Passing through a forest of mammoth trees, some of them nearly 300 feet high, we find ourselves on the tide-waters of the Pacific at the eastern extremity of Burrard Inlet. Following the shore of this mountain-girt inlet for half an hour, our train rolls into the station at Vancouver, the western terminus of the C.P.R.

The Canadian Pacific Official Guide.

Vancouver

Tacoma is very prettily situated on Puget Sound, with the lovely snow-topped Mount Tacoma standing solitary in the background. Vancouver, the terminus of the Canadian Pacific Railway, is the rival of Tacoma, the terminus on Puget Sound of the North Pacific. Tacoma has the advantage of a second great route, the Shasta, to San Francisco, and has a richer district at the back of it, besides being equal to Vancouver as a port.

We had a splendid drive in Vancouver Park, which is a piece of primeval forest, with good roads cut through it. The trees are enormous, and moss grows on the lower branches like wool on sheep. At one point we had to walk through a narrow path amongst the big ferns which cover the ground to see the biggest tree of all, which is more than 30 feet round the trunk and immensely tall. The shell-beach is another of the great features of the Park. It is a large piece of ground near the water, which is formed yards deep of nothing but shells. Immense trees, most of them 70 feet high, and some probably more, are growing on this great shell-bed. The drive round the park is 10 miles long, with lovely views on to English Bay, the Narrows, and Burrow's Inlet. The mountains on the other side of the water, opposite Vancouver, are very beautiful.

Mrs. CARBUTT.—*Five Months in Canada.* Sampson Low.
By permission of Messrs. Sampson Low.

Victoria and Esquimalt

Towards nightfall we had the south end of Vancouver on our right. Here it is lower than to the north. Groups of trees and denser forest, interspersed with open glades and stretches of what looked like pasture, and houses, stood about. Then we saw the electric lights on shore, passed by a lighthouse on a point of land, entered a bay, and had arrived at the fair Island City.

Our first excursion was to Beacon Hill, which is in the public park, a suburb of Victoria. Looking down due south one sees the sea, and across it, some 20 miles away, a glorious range of mountains. The water is the Strait of San Juan de Fuca; the mountains are the Olympus range in Washington Territory, United States.

The ice-crowned Mount Olympus, highest of the range—his crest being more than 40 or 50 miles away—shines out in sunlight; then a shadow veils his splendour, but other peaks come flashing into view. The valleys are filled with

VICTORIA CITY, BRITISH COLUMBIA.

soft blue mist, which as the sun sets turns to purple, and the snowy peaks shine out in gold and fire. Turning now to the westward we see the entrance to Victoria Harbour, and beyond, four miles from us, the entrance to Esquimalt Harbour.

That morning we sat an hour entranced, then turning northwards we looked on land, to where, across more ridges and valleys, arose the icy crown of Mount Baker.

The walks and drives round Victoria are all picturesque. Bracken grows everywhere; every roadside was a mass of it. Wild roses were a wonder; the flowers varied from white to deep crimson. They were all about the place, even beside the fences in the city, often growing so vigorously that they might fairly be called trees.

Esquimalt is 3½ miles from Victoria. The road thither is an exceedingly pretty one.

The town or village of Esquimalt is hardly worth mentioning; the Navy Yard is all that one goes there to see, and well worth a visit it is. It is about as little like what one would expect a navy yard to be as can be imagined. On entering the gate, where there is a sentry on duty, you perceive a winding road, shaded by an avenue of broad-leaved maples; to right and left are several well-kept buildings, embowered among trees and flowers. Then you enter on a space of undulating land on which are grouped a great variety of trees, principally maples, oaks, and pines. The ground is ridged and seamed with rocks, deep brown, purple, chocolate, and red, on which in great profusion grow creepers and ferns. Amongst these rocks are rose-bushes, sweet-briar, and many clumps of sumach and dwarf firs.

Turning to the left, you get a row of offices, each with its vine and rose-covered verandah. Moving on you come to a high point on the rocks, from which you get an admirable view. You now find that the Navy Yard occupies the tongue of land which separates Esquimalt Harbour from the Strait of Fuca, and which, in fact, makes it a harbour.

Facing north we had spread out like a mirror the full extent of Esquimalt Harbour, a perfectly land-locked natural basin, about three miles long by two broad, where were lying the ironclad *Triumph*, the flagship, and H.M.SS. *Condor* and *Caroline*, besides several merchant ships.

This basin of blue and tranquil waters is surrounded by rocky hills and trees and flowers. An arsenal is there, a naval hospital, and a grand dry dock; there are wharves and landing-stages, guns and piles of shot, red-coated sentinels and blue-jackets; and thus, with a mixture of green grass and roses, graceful trees, guns, soldiers, flags, and banners, we saw a very lively scene. Sailors coming there from a lengthened cruise must surely think that they have found an earthly paradise, for it looked more like that to us to-day than a naval station fully armed for war.

T. Roper.—*By Track and Trail.* W. H. Allen.
By permission of Mr. W. H. Allen.

IV. THE UNITED STATES

The United States

At the conclusion of peace with the mother country, at the close of the Revolution, the United States exercised jurisdiction over the territory east of the Mississippi River and north of the parallel of 31°, the northern and eastern boundaries being the same as at present. These limits enclosed an area of a little more than 900,000 square miles, or about one-fourth the present extent of the country. At various times accessions were made to this territory, the first being that of Louisiana, in 1803, which was bought from the first Napoleon for a song, because he believed it to be in imminent danger of seizure by Great Britain. With it came Oregon, now the states of Idaho, Washington, and Oregon, although the title of the United States to that tract was not recognised by Great Britain until many years thereafter. Then, in 1821, the Floridas were purchased from Spain, not because the territory was particularly desired, but because it seemed to be the easiest way to settle a perplexing quarrel with that country regarding limits.

In 1847 Texas came into the Union of her own volition. The south-western states and territories—California, Nevada, Utah, Arizona, most of Colorado and New Mexico—were acquired by conquest from Mexico, although the United States went through the form of purchasing the region. The last acquisition was that of Alaska, purchased from Russia in 1867.

Thus the territory has grown, by a few great accessions, from a little more than 900,000 square miles to 3,600,000 square miles, and at present comprises about one-half the land of North America. With the exception of Alaska, it is in one compact body, covering most of the temperate zone of the continent, and extending from sea to sea. Alaska may be dismissed from this discussion. Although vast in extent, its population and productions are as yet trifling in comparison with those of the main body of the country.

The great features of the country are simple. Its skeleton is composed of a high, broad mountain system, occupying the western portion of the continent — the Cordillera — and a lower narrower system in the east, the Appalachians. From the latter the land slopes to the Atlantic coast, this incline being known as the Atlantic Plain. Between the two systems of elevation is a broad valley, with long slopes on either side, the northern part of which is drained by the Great Lakes and the St. Lawrence, and the southern part by the Mississippi.

H. GANNETT.—*Scottish Geographical Magazine*, April 1898.

By permission of the Royal Scottish Geographical Society.

Distribution of Occupation in the United States

In all parts of our land there is so much of winter that man must provide himself with clothing, shelter, and fuel. Natural fruits, to be had for the plucking, will not sustain him, and he is compelled to earn his food. Thus Nature forces him to labour and to contrive, and his physical and intellectual faculties are developed, like the athlete's muscles, by exercise. From variety of configuration, of mineral resources, and of climate, flow varied and complementary industries. Agriculture flourishes in the Atlantic and central provinces, on the morainic hills and lacustrine plains of the lake district, and, with irrigation, in intervals of the Cordilleras. Its products range from the hardy apple to the frost-shunning banana. Along the western borders of the central plain and in cordilleran valleys the herdsman tends his band of horses, kine, and sheep. In the humid north-west, in the recesses of the mountains, and on the tracts of inferior or scanty soil, are forests for the lumber-man. In mountains and roots of mountains are ores for the miner, and from the hills he draws fossil fuels. Manufacture finds natural power in waterfall, coal, and gas, and the way of commerce is made easy by the harbours of the coast.

G. K. GILBERT.—*Journal of School Geography*, 1898.
By permission of Prof. R. E. Dodge.

V. THE EASTERN HIGHLANDS AND COASTAL PLAIN

The Appalachian Barrier

THE Appalachian system, which presented such an insuperable barrier to the early colonists, extends from the Saddleback Mountains of Maine to the pine-covered hills of Georgia. It consists in general of parallel ranges, altogether some 300 miles in width, which stretch along with only one considerable break in all their length of 1300 miles. A mantle of primeval forest, with a singularly dense undergrowth, contributed further to make them impassable. The backwoodsman had fairly to carve a path for himself through this wall of living green.

In consequence, the tide-water country had its long-established colonies before anything of the mountains was known. The rivers flowing down the eastern slopes were not navigable, and, therefore, did not afford ready access into the interior; but when followed to their head-waters they were found to disclose excellent passes. This was especially true of the southern portion of the system, but even here the disposition of the passes involved long circuitous routes to reach the western slopes, for, one range passed, the next one presented a similar barrier, and the longitudinal valleys in between had to be traversed before another gap could be found. These trough-like valleys, therefore, became natural high-roads, and had a pronounced effect in the distribution of the population when it finally began to move towards the west. The Scotch-Irish emigrants from Pennsylvania found themselves landed in Western Virginia and Kentucky ; and those from Virginia followed these depressions southwards into Tennessee. The Pennsylvanians gained access to the Ohio by the west branch of the Susquehanna, and also by another route further south from the Juniata to a tributary stream of the Alleghany. The Virginians, though, found a more direct way up the valley of the Potomac, and thence by a short portage to the Monongahela. Among the broken hills of the extreme end of the Alleghanies, an almost level route was frequented by the traders from the Carolinas and Virginia seeking the Cherokee villages: it was known from the earliest times, but had only a limited use, because it was too remote from the north-western Indians, who commanded the all-important fur trade.

The only important break in this mountain wall was to be found in the natural depression of the Hudson Bay and Mohawk valleys, where the pass into the interior is only about 175 feet above sea-level. Significantly enough, we find an English settlement as far inland as Schenectady as early as 1661. This route was also able to tap the north-western fur trade, then in the hands of the French. Furthermore, trails led from the Mohawk and Genesee to the upper Alleghany, and thence to the Ohio and Mississippi. For this reason it became apparent at an early date that the Mohawk and Hudson valleys formed the key to the north-west, as the meeting-place of the Alleghany and Monongahela was in reality the "Gateway of the West."

Hemmed in thus by the mountains, for the first 150 years of their occupancy the English settlers were limited to the tide-water region of the Atlantic coast. This seaboard country presented in its different portions different aspects, which had a corresponding effect upon the colonists. In New England the Atlantic plain is only from 50 to 80 miles wide, but it gradually broadens as it continues southward, till in the Carolinas the mountains are 250 miles back from the sea. The area adapted to settlement was, therefore, more extensive in the south than in the north.

Furthermore, the northern district had suffered glaciation; it was covered with a heavy deposit of boulders, which had to be removed at the cost of infinite labour before the land was ready for cultivation. The hardest work had to be done before a plough could be used; but this once over, the soil could be tilled for a long time without giving signs of exhaustion. This fact, together with the small area at their command, preserved to the settlers the contracted territorial ideas which they had brought with them from the Mother Country, and served to root them in the soil. Consequently the people of New England developed none of the tendency to expansion which later became a characteristic of the American people.

That tendency developed farther south. Here the larger unobstructed area invited it, and the leading occupation of the settlers—tobacco culture—made it a necessity. At a time when artificial manures were unknown, the production of the better kinds of tobacco demanded a virgin soil. The planters were, therefore, led to take up as large tracts as possible. The only preparation was "girdling" the trees—the primitive mode of clearing the land which the colonists learned from the Indians. Land so prepared was planted in tobacco for three years, and afterwards in corn. The method of cultivation was superficial, and the materials taken from the soil were never replaced. By this system of agriculture, the evils of which were further accentuated by slave labour, low lands were exhausted in eight years, fields less favourably situated in three. Ceasing to yield, they were abandoned, and allowed to revert again to a state of nature. Thus developed that spirit of expansion which, early in the eighteenth century, led the settlers to hammer at the gates of the mountain wall on their western frontier, and to resent the claims of the French that the British possessions were limited by the crest of the Alleghanies.

For 150 years the American people were dammed up against the mountain barriers. The British Government, taking its cue from the natural features of the country, forbade all permanent settlement beyond the Alleghanies, for the purpose of keeping the western country as a reserve for the fur trade. But the energies aroused by the prosecution of a successful war, and the snapping of the cords which held the colonies in leash to England, enabled the mass of American life to widen the old breaches in the mountains, and rush down the Mississippi valley and beyond, till in half the time it had taken to reach the crest of the Alleghanies they were planting their towns on the genial coast of the Pacific.

Ellen C. Semple.—*Journal of School Geography*, 1897.
By permission of Prof. R. E. Dodge.

Mountains of New England

Gorham is the gateway to the New England mountain region, and is a picturesque and thriving village situated in a broad and beautiful valley at the confluence of the Androscoggin and Peabody rivers, at an altitude of 800 feet above tide-water at Portland. The scenery in the vicinity of the village is remarkably striking, both in the vistas of the different mountain ranges and the isolated peaks which loom up at different points, and the rivers and waterfalls. The range embracing Mounts Norwich, Carter, and the Imp in particular, is seen to great advantage. Mount Carter is one of the highest, and Mount Norwich the most graceful of the White Hills in New Hampshire, and the best view of them is from the Alpine House, situated at the station of the Grand Trunk Railway system. A noble range of hills rises up to view on the north-west of Gorham, and is known as the Pilot range, while to the east are seen the Androscoggin Hills, which wall in the valley on that side. Mount Hayes (2500 feet), directly behind the Alpine House, is the highest of these latter, and may be ascended by a footpath leading to the summit in about two hours. The view from the top of this mountain is magnificent. Mounts Adams and Jefferson are in full view, and Mount

Washington is seen to better advantage than from any other point.

Beautiful carriage roads radiate from Gorham in every direction, and no other place can boast of more magnificent drives than from this point. One of the most beautiful is along the valley of the Peabody River to the base of Mount Washington, continuing along the ascent to the summit. Views of superb grandeur are seen in every part of this trip. From Lead Mine Bridge, four miles east of the village, a pleasing view is obtained of the Androscoggin River, dotted with islands in the foreground, with the mountains in the distance. Between five and seven o'clock p.m. the scene is one of greatest beauty, when the sun is setting behind the mountains. An extremely attractive drive is along the banks of the river leading to Berlin Falls, where the whole volume of the Androscoggin pours over a granite ledge, descending nearly 200 feet in the course of a mile.

Mount Washington, looking out from beyond a head taller than all the others, is the mountain monarch of the north, about whose summit, veiled in clouds and darkness, the thunder-god occasionally holds his turbulent court. From the base of Mount Washington can be seen the five highest peaks of the range. Near by the waters of the Peabody go rollicking down the pass.

The romantic attractions of this locality—glens and gorges, torrents, slides, lakelets, and waterfalls—are unequalled by those of any other in the mountain region, while many of the steeps and ravines remain yet unexplored, tempting the courage and activity of the adventurer.

No one ever described the ocean so as to give a true impression of it, or the sea-like extent of one of the western prairies, or the Falls of Niagara; and all attempts to impress the view, in a clear atmosphere, from Mount Washington and others must be nearly futile. You stand in the centre of a circle of country 250 miles in diameter —high above all. An ocean of earth-billows, misty and sombre, reels away to the far horizon, on every side—

an ocean which has, as it were, by "stroke of the enchanter's wand" become suddenly and for ever congealed.

Far in the north is Moose Head Lake, looking like a strip of burnished silver amidst a region over which the shadows of night have fallen. There, too, is Mount Kineo, and the elephantine summit of Katahdin crouching beyond. Westerly are the Green Mountains of Vermont rolling along the outer edge of the circle like the humps of a great sea-serpent, and more than a hundred miles distant to the south-west is Mount Monadnock, peeping over the intervening ridges.

Grand Trunk Railway Official Guide.

The Connecticut Valley

The early colonists of Massachusetts Bay had but just established their new homes, on the other side of the Atlantic, when their curiosity and ambition were aroused by reports of an attractive country and fertile soil in the valley of the great river, called after its Indian name, Connecticut. The description of the level, well-watered, mellow meadow-lands appealed strongly to a people of agricultural pursuits. The contrast with the hilly, stony, and but moderately fertile coast country increased the desire to go up and possess this new land of promise. In 1636 a band of emigrants from Massachusetts Bay journeyed to the valley of the Connecticut, and there, opposite to the mouth of the Agawam River, founded the town of Springfield. Only the time of one generation was required to occupy the broad alluvial plains in the valley, while the neighbouring highland as yet remained untouched.

The struggle with the Indians held the settlers well within the limits of the valley, and it was not until the early part of the eighteenth century that the hill country was opened. The inhabitants of the main valley made their way along the tributaries and selected sites, where small flood-plains gave promise of good tillage. Bands of emigrants from the east moved across the country, and finding the valleys occupied, settled in the most desirable location on the upper plateau. The stone walls on the farms of the hill country tell their own story of the struggles of the settlers with adverse conditions of soil and tillage.

Of necessity the character of the farming of the upper plateau was much different from that of the lowland. The valley produced rich, luxuriant crops of hay, corn, grain, and vegetables; on the hills hardier crops flourished, while the farmer placed much dependence on pasturage and woodland.

As soon as the period of settlement under the agricultural impulse drew to its close, the people began to consider better means of communication with each other and the outside world. A thriving boat industry grew up on the great river, and to facilitate passage around the rapids canals were constructed at Turner's Falls, at Holyoke and Enfield, and an unobstructed waterway was opened to the Sound.

Trade relations were thus established with the towns of Connecticut and New York. The demands of this traffic led certain capitalists to construct a canal from Northampton through Westfield to New Haven. The route which the canal followed was a narrow, longitudinal valley between the steep range of Mount Tom and the western hills. This ambitious enterprise was destined to financial failure, for railroads supplanted it before adequate returns were received on the investment.

The route which the railroad followed was determined in the main by geographical conditions. The valley of the Chicopee River afforded an easy means of approach from the east, and the traveller can see for himself how closely the tracks follow the stream. On the Albany side of the Connecticut River the Westfield has cut a channel back to the divide between the basins of the Connecticut and of the Housatonic, and this the railroad utilises.

The development of Springfield was thus fostered, and the many towns along the route enjoyed a decided advantage over the more remote settlements. The transverse valley, formed by Miller's River and by the Deerfield River, in the northern part of the State, is now occupied by the Fitchburg Railroad. Many thriving towns, such as Fitchburg, Orange, Greenfield, and Shelburne Falls, have prospered through this route. The third and latest railroad, from east to west, begins at Northampton and makes its way across the meadows of Hadley, through Amherst, and thence by a devious route to Boston.

Two longitudinal valleys, besides that of the Connecticut, have been occupied by railways. One contains the important towns of Amherst, Palmer, Monson, and is the line of the New London Northern Railroad. West of the Connecticut River the New Haven and Northampton Railroad has taken the place of the canal, which bore the same name.

The railway system of the Connecticut valley, then, consists of three important routes from east to west, and a like number from north to south, and important towns are found at points where any two roads cross. The northward extension of the Connecticut River Railroad has made the valley the main route from New York to Canada, while Springfield is on the route from New York and from the west to Boston.

The third stage in the history of the valley was characterised by growth in manufacturing industries. Sawmills and grist-mills were operated by water power of the mountain brooks from very early times. It was, however, the combination of means of transportation by rail with the utilisation of water power that made possible the establishment of the great manufactures of which the valley is proud. The growth of Holyoke is a striking illustration of the value of a water privilege. Until 1840 or thereabouts Holyoke was a small, insignificant settlement. The Connecticut River at Holyoke, however, makes a descent of six feet in one and a half miles; and in 1849 a dam was built across this stream, which gave its projectors the command of 30,000 horse-power. Holyoke has now become a city of over 40,000 population, and possesses the most important manufactories of paper in the world. The power furnished by the dams at Turner's Falls also supports many thriving industries. Along the tributaries of the Connecticut are to be found Chicopee, with its workshops for the production of textile fabrics and metal goods; Shelburne Falls, on the Deerfield; Haydenville, Florence, and Leeds, on the Mill River at Northampton. These and many other towns owe their prosperity to the water privileges they possess.

The rich alluvium of the valley lowland is a source of prosperity to the farmer; the slope of the upland and the valley furnish the necessary conditions for the water power on which the manufacturer depends; the valleys formed by the erosion of the rivers and by the folding of the hills constitute the avenues along which trade and commerce move.

This limited area thus furnishes a good illustration of the influence of the earth's surface features and geological structure on the progress of man.

W. Orr, jun.—*Journal of School Geography*, 1897.

Up the Hudson to Albany

By nine o'clock we were waiting on the shores of the Hudson River for one of the floating palaces which ply to and from Albany. A fresh wind dappled the blue sky and raised the muddy waters of the grand old Hudson. Across from New Jersey and Hoboken, those thriving suburbs of New York, came the busy hum of life. The well-wooded hills are clothed with villas, whose domes or towers peep out from amongst the dense foliage. Here the merchants from the great city take their rest and pleasure. On the opposite shore the great wall of basaltic trap-rock, known to the early settlers by the name of the Great Chip Rock, but to their successors as the Palisades, forms an impenetrable wall, rising in a sheer precipice from the river, a height of from 300 to 600 feet.

At Tappan Zee the river opens out into a lake ten miles broad. The beautiful bay of Haverstraw leads to the narrow defile and the northern gate of the highlands. In rugged and varied beauty the mountains close us in on every side, overshadowing us with their wooded heights, maple and sycamore mingling with darker belts of pine, or a thick undergrowth of stunted oaks.

"The glory of the Hudson is at West Point," says a well-known author, and there could not be a more beautiful situation for the Military College of the United States than at West Point. It stands on a commanding bluff, the river winding round three sides of the promontory in an almost impregnable position.

From the southern gate of the highlands green marshy fields, with weeping willows trailing along the banks, form the chief feature of the landscape, and we pass several thriving towns like Peekskill and Poughkeepsie. In the afternoon, blue and purple in the far distance, we saw the glorious range of the mighty Catskill Mountains. The evening was closing in as the steamer passed under the swinging arch of the bridge at Albany, the chief town of New York State.

LADY VINCENT.—*40,000 Miles by Land and Water.* Sampson Low.
By permission of Messrs. Sampson Low.

The Eastern Gateway of the United States

The mountain barrier of eastern North America stretches from central Alabama, north-easterly through Labrador. The vast lowlands of the Mississippi valley and the great plains of Canada lie on the west, and the Atlantic Ocean, with a rim of coastal lowlands, on the east. The mountains are nowhere lofty as compared with the high mountains of the globe, but they are often rugged, and in the universally forested condition of the early days formed a barrier nearly impassable to human intercourse. The system is made up of elements diverse in age and character. Oldest of all are the Adirondacks of northern New York, and the so-called Appalachian protaxis of Dana. The latter consists of the highlands of the Hudson, the uplands of New Jersey, South Mountain in Pennsylvania, the Blue Ridge of the Southern States. Extending southward through New England, not far eastward from the Adirondacks are the next oldest mountains of the system, the Green Mountains of Vermont, extending south through Massachusetts and Connecticut. The newest part of the system is the Appalachian range proper, a great series of folds in Palæozoic strata, extending from Alabama to Catskill, New York, a point about 120 miles north of New York, on the Hudson River.

By successive deformations, nature seems thus to have walked in the seashore from the great heart of the continent. Two gateways, however, lie open. One of these is the St. Lawrence valley. We go several hundred miles to the south, enter New York harbour, and sail up the tidal course of the Hudson. Soon after leaving New York we traverse the trench cut through the ancient highlands. Then we have on the east the Green Mountain range, and on the west the low northern terminus of the Appalachian folds. A few miles farther west, and rising far higher, is the great easterly facing escarpment of the so-called Catskill Mountains — really the north-eastern terminus of a plateau lying west of the mountain folds from Alabama to eastern New York.

Leaving tide-water at Albany, we rise over a stretch of nearly 20 miles of barren glacial sands to Schenectady, where we find an open road leading to the west. This is the Mohawk valley, the eastern gateway of the country. Northward, or on our right as we go west, rise the rugged foothills of the Adirondack Mountains. Southward, on our left, are seen the bold escarpments of the Helderberg Mountains, which are really the steep slope by which the long plateau drops off to low ground at its northern end.

We have to do with a trench of about 90 miles long, from Rome to Schenectady. Easterly it opens into the broad Hudson lowlands; westerly it widens into the lacustrine plains of Iroquois, the larger glacial antecedent of Lake Ontario. Once past the gateway at Rome and the path is clear, over the lake plains and prairies, to the Far West. Seen from the railway as we pass, the valley appears to be a trench about 500 feet deep, with moderately steep sides, and with an average width of river and flood-plain of about one-half mile. Seen more truly from the bordering uplands, it is a vast gap, 1500 to 2000 feet deep, several miles wide in its higher parts, lying between the Catskill plateau and the Adirondack Mountains.

From Utica to Syracuse, 53 miles, the Erie Canal traverses a single level. From Syracuse to Rochester, 81 miles, the uniformity is nearly as noteworthy. From Rochester to Buffalo, a gentle swell is passed at Batavia at a little above 800 feet. This is, by this route, the highest point between New York and Chicago, or between New York and points far beyond the Mississippi River.

The first European explorers and settlers in the region now known as the State of New York, found established there several powerful Indian tribes, known as the Confederacy of the Five Nations. They occupied the region which extends from the Mohawk valley eastward. Northward is Lake Ontario, westward are the Genesee country and Niagara, and on the south lies the fine series of Finger Lakes. It is a country moderately diversified, highly fertile, and is now one of the garden spots of the United States. This was the famous "Long House" of the Five Nations. The Mohawks were the most easterly of the tribes, and they called their fair valley the eastern gateway of the "Long House," and they were its keepers. These tribes were in a comparatively advanced state. They practised agriculture extensively, lived in neat and comfortable cabins, possessed considerable industrial skill, were eloquent in public counsel, and were the objects of widespread fear through their prowess in war.

With these sturdy aborigines the European emigrants found themselves in alliance or at war. One avenue of approach was by ascent of the Hudson River. A second was through the Champlain valley from the St. Lawrence. A third lay along the eastern shore of Lake Ontario by the site of Oswego. Thus from the first the rippling waters and bordering flood-plains of the Mohawk were a beaten path, frequented by French, Dutch, and English in various contact of war and peace with the natives of the land.

Of these the French were the first to invade the Mohawk country. Had they won this great highway, they might in later years have maintained themselves on the St. Lawrence, and have held the keys of the new world.

It was the Hudson-Mohawk valley which early guided the Dutch in their efforts to carve a slice from the new continent. Under an English commander, Hendrick Hudson, they sailed up the river which bears his name. Coming to the limit of navigation, they built Fort Nassau, below the site of Albany, and concluded a treaty with the Mohawk Indians. They built Fort Orange in 1622, and thus laid the foundations of Albany. In 1642 Arendt van Curler entered the Mohawk country, reported its lands as "the most beautiful that eye ever saw," and was later authorised to buy the "great flats" where Schenectady now stands. The old towns and family names of the lower Mohawk still bear proud testimony to this wave of immigration, in the ever present Fondas, Schuylers, Sprakers, Sammonses, Van der Veers, and Yosts of the river country.

The first white settlement in the upper stretches of the valley was made by the Palatines in 1723. Following the devastating wars of Louis XIV., thousands of these stricken people left their homes on the Rhine and took refuge in England. Some of these were sent to America. Their descendants have been powerful in the history of the State and nation.

The next wave of immigration which swept up the valley was English. In 1784 Hugh White passed the

Hollanders of Schenectady and the High Dutch of German Flats, and founded Whitestown on the upper river. His coming was the signal for a lively movement from the stony slopes of New England to the inviting fields of the Long House, to which the Mohawk was the only road. Then came the stream of emigrant waggons bearing the names of Ohio and Indiana—regions which were then the Far West.

This stream of travel has never ceased to flow, but has rather augmented a thousand times in the century which has passed.

In the pioneer days the Mohawk was considered a navigable stream, and immigrants and freight were conveyed over its waters in boats propelled by poles. Several breaks were, however, necessary—a first beyond Albany, because of the abrupt fall of 70 feet at Cohoes; a second at Little Falls, on account of the impassable rapids over the gneissic barrier which the stream there encounters; and a third of two miles at the Oneida carrying-place, where the Mohawk is left to the east, and the winding course of Wood Creek is followed to Oneida Lake. Soon after 1791 a canal three miles long, with five locks, was constructed at Little Falls, and a further canal conducted boats across the Oneida carrying-place. Enlarged boats with five men could transport, between the terminal points of navigation on the river, twelve tons in ten days. Long lines of waggons and stages also traversed the bottom lands, making the valley a busy highway between the east and the expanding west.

A continuous waterway from the tidal waters of the Hudson to the blue expanse of the Laurentian lakes became now the subject of serious discussion. The demand was strengthened by the danger that the growing commerce of the Genesee country would be diverted either down the St. Lawrence to Montreal and Quebec, or by the Susquehanna to Philadelphia. Navigation was finally opened between Lake Erie and the Hudson in 1825. Of the vicinity of Rochester, it is said, upon completion of the canal, that her timber found market and floated away, wheat quadrupled in price, the mud dried up, the mosquitoes, the ague and fever, and the bears, left the country, and prosperity came in on every hand. In like manner, the salt, gypsum, lime, and grain of Onondaga, where is now the great city of Syracuse, found ready market. But it is not enough to cite these comparatively local results. The meaning of the Mohawk valley is that the entire region of the Great Lakes, and the vast prairie and mountain regions of the west, became tributary to the rising metropolis on Manhattan Island. Hence it is that New York, rather than Boston, or Philadelphia, or Baltimore, is the metropolis of the western hemisphere.

A similar story has to be told of railway communication through this valley. Gradually the line was completed from New York to Buffalo, 490 miles, and became known as the New York Central and Hudson River Railway, or more commonly as the New York Central, one of the greatest railways in the world. There is not a difficult grade or an embankment or trestle of any importance between New York and Buffalo, and with slight exception this holds good from Buffalo to the Rocky Mountains. Two thousand miles of splendid country are thus made tributary to the harbour of New York through the river gateway which we have described.

To sum up, the valley is now threaded by the ancient highways, the Erie Canal, six railway tracks, and innumerable telegraphs and long-distance telephones, by which New York converses with Detroit, Indianapolis, Chicago, and other western cities.

PROF. A. P. BRIGHAM.—*Geographical Journal*, May 1899.

By permission of the Royal Geographical Society.

The Shenandoah Valley

This valley forms the north-eastern third of the great valley that extends for nearly 360 miles diagonally across Virginia. This latter valley in turn forms about onetenth of the Appalachian valley that, under the various local designations of Champlain, Hudson, James, Roanoke, New River, Holston, East Tennessee, and Warrior, extends from the St. Lawrence to the Alabama River, a distance of 1500 miles. It is walled on the east throughout its whole extent by the Blue Ridge, on the west by the ranges locally known as the Catskill, Swanangunk, Blue, North, and Cumberland. It is a limestone tract, embracing 30,000 square miles of the best farming and grazing land on the continent, margined on each side by inexhaustible deposits of richest hematite iron ores.

The Shanando, as the negroes call it, includes about 5,000,000 acres of land. The valley is especially noted for its grain and grass-growing capacities.

E. KING.—*Southern States of North America.* Blackie.

By permission of Messrs. Blackie.

For the Great Dismal Swamp of Virginia, see *ibid.*, p. 588.

The Great Smokies

The chain of the Smoky Mountains which we had traversed extends for about 65 miles, from the deep gorge through which the French Broad River flows at Paint Rock to the outlet of the Little Tennessee.

The dominant peaks in this line of mountains north of Road Gap are Mount Guyot, 6636 feet high, Mount Alexander, and others. South of Road Gap rise the peaks known as Clingman's Dome, 6660 feet high, and a dozen others, more than 5000 feet high. Many of them overtop Mount Washington, the monarch of the east, by several hundred feet.

The gap through which we passed was at an elevation of at least 5000 feet; beneath us were vast cañons, from which came up the roar of the creeks. We looked down upon the tops of mighty forests, and now and then, descending, caught a glimpse of the symmetrical Catalouche Mountain, fading away into distant blue. There are no gaps in the Smoky Range which fall below the level of 5000 feet, until Forney Ridge is passed; and there is a surprising number of peaks and domes rising higher than 6000 feet.

Once having traversed the barriers created by this vast upheaval, one enters the mountainous region comprised between the Blue Ridge and the chain of the Iron, Smoky, and Unaka peaks. This region properly begins at the bifurcation of the two chains in Virginia, and extends across North Carolina and into Georgia for 108 miles. The chain of the Blue Ridge to the eastward is fragmentary, and the gaps are only from 2000 to 3000 feet.

All the region between the Blue Ridge and the Smoky is filled with spurs and chains. Into this cluster of highlands, extending to the extreme western boundary of North Carolina, we now daily made our way.

The journey was but a succession of grand panoramic views of gorge and path. The road grew narrower and rockier as we climbed along Catalouche, but the air was cooler, the vistas more charming. At sunset we came to the Cove Creek Gap. As far as eye could reach, to right, to left, in front, stood the long line of uncounted crags, from which there seemed no outlet. Turning our horses on the crest of the mountain, and looking Tennesseewards, we saw our old friends of the Great Smoky, scattered for miles among the dark forests, westwards and eastwards deep ravines, and beyond them uncounted peaks.

E. King.—*Southern States of North America.* Blackie.

By permission of Messrs. Blackie.

See "North Carolina," p. 107.

The Cumberland Mountains

The writer has been publishing during the last few years a series of articles on Kentucky. As he comes to take leave of his theme he finds his attention fixed upon that great mountain wall which lies along the south-eastern edge of the state.

Consider for a moment what this great wall is. You may begin at the western frontier of Kentucky, on the Mississippi River, some 500 miles away, and travel steadily eastward across the billowy plateau of the state, going up and up all the time, until you come to its base; and above its base it rises some 3000 feet. For miles before you reach it you discover that it is defended by a zone of almost inaccessible hills, with steep slopes, forests difficult to penetrate, and narrow jagged gorges; and further defended by a single sharp wall-like ridge, having an elevation of about 2200 feet, and lying nearly parallel with it, at a distance of about 20 miles. Or, if you should attempt to reach this wall from the south, you would discover that from this side also it is hardly less hostile. On account of this mountain barrier the entire civilisation of the state has had a one-sided development. It has become known for pasturage and agriculture, whisky, hemp, tobacco, and fine stock. On account of it, the great streams of colonisation have divided and passed round Kentucky as waters divide and pass round an island, uniting again on the farther side. It has done the like for the highways of commerce. Thus, keeping out railroads, it has kept out manufactures, kept out commerce, kept out industrial cities.

On the Kentucky side of the mighty wall of the Cumberland Mountain, and nearly parallel with it, is the sharp single wall of Pine Mountain, the western ridge of the Allegheny system. For about 100 miles these two lie side by side, guarding between them an immense valley of timbers and irons and coals. Near the middle point of this inner wall there occurs a geological fault. The mountain falls apart as though cut in twain by some heavy downward stroke, showing on the face of the fissure precipitous sides wooded to the crests. Thus there is formed the celebrated and magnificent pass through which the Cumberland River slips silently out of its mountain valley, and passes on to the hills and plateaus of Kentucky. In the gap there is a space for the bed of this river, and on each side of the river space for a roadway and nothing more. Travel east along Pine Mountain or travel west, and you find no other water gap within 100 miles. But for this single geological fault, by which a water gap on the inner mountain was placed opposite a depression in the outer, thus creating a continuous pathway through both, the colonisation of Kentucky, difficult enough even with this advantage, would have been indefinitely delayed. Through this inner portal was traced in time the regular pathway of the pioneers, afterwards known as the Wilderness Road. It led from Baltimore over the mountains of Virginia, through the great wilderness by Cumberland Gap. All roads below Philadelphia converged at this gap, just as the buffalo and Indian trails had earlier converged, and just as many railroads are converging now.

J. LANE ALLEN.—*The Blue-Grass Region of Kentucky.* The Macmillan Co.

By permission of The Macmillan Co.

For an excellent account of life in the fastnesses of the Kentucky mountains, see Miss E. C. SEMPLE's admirable paper, "The Anglo-Saxons of the Kentucky Mountains," *Geographical Journal,* June 1901.

Chattanooga, the Southern Gateway of the Alleghanies

The Appalachian chain of mountains divides in West Virginia into parallel ranges, the Alleghanies on the east, and the Cumberland on the west, and these, converging again at Chattanooga, are broken through by the Tennessee, which is here a broad river, already fed by half a dozen navigable streams that drain wide and fertile regions. The course of the river from this point to the Ohio is north-west, and hence it must form a link in any chain of through line of water communication between the north-western and south Atlantic states. Chattanooga commands this river and also the great Appalachian valleys which extend through Virginia, Tennessee, Georgia, and Alabama, and the topography of the country is such that no practicable connection between the south-west and the north-east can be had except at this crossing of the Tennessee. The location is the apex of an inverted triangle, whose diverging lines reach to the far north-east and north-west, and hence nature has distinctly marked it out as the site of a great city.

Though itself only 700 feet above the sea, Chattanooga is surrounded by mountains, and in the midst of scenery as grand and picturesque as any country. From the summit of Lookout Mountain, only 2½ miles away, the view is of almost unparalleled magnificence. The eye ranges over portions of five states, across spreading forests, cultivated fields, scattered farmhouses, and thickly settled towns nestling among high mountains. The tall cliffs of Cumberland Gap, 130 miles north-east, may be distinctly seen, and through the whole wide landscape winds like a silver thread the beautiful Tennessee.

E. KIRKE.—*Harper's Magazine*, April 1887.

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See also KING, *Southern States*, Blackie, pp. 530-535.

Mammoth Cave, Kentucky

The Main Cave runs from the Rotunda to the Cataracts, and then the name is given to a continuation on another level to what is styled Ultima Thule. It is like a great trunk from which the minor avenues branch; and it must be followed for some distance, whatever route the visitor takes. On the right Audubon Avenue opens from the Rotunda, leading to Olive's Bower, the mushroom beds, and the Crevice Pit, an ugly hole, whence by a rope one might be lowered into the Egyptian Temple and the Mammoth Dome. Advancing in the Main Cave, we find a worn cart-road for some distance, and the vats, pumps, and pipes, and the heaps of earth, left by the old miners, and the chapel where they used to worship. The average dimensions of the passage-way are about 60 feet in width, and 40 feet in height, with frequent enlargements and occasional contractions. It is evidently the channel of an ancient river, which here and there parted and reunited, forming islands which are now so many pillars supporting the ponderous roof. On our left is the opening to a singular filled-up pit called the Corkscrew, down which we might scramble to River Hall.

On our right we came to the Gothic Avenue, with its dry, dusty floor, its aged stalagmites, its bridal altar, where many a runaway couple have been wed, and many grotesque formations resembling elephants' heads, arm-chairs, and other fantastic objects. Presently we come to the Giant's Coffin, a huge detached rock. Incrustrations of gypsum, stained by the black oxide of manganese, mottle the ceiling-like clouds, and occasionally take unique shapes called by fanciful names. Ruins of stone cottages are pointed out, where consumptives dwelt, many years ago, hoping to regain lost health in the pure atmosphere and uniform temperature. Then we come to the Star Chamber, whose canopy is intense black, spangled by snowy gypsum stars. As we pass along through Proctor's Arcade and Kinney's Arena, the ascending column of hot air from our lamps, and the shouts of the guides, bring down a myriad flakes of Glauber salts in a mimic snowstorm. We pass tumultuous assemblages of fallen rocks called "cities," of which there are five in all. The Chief City is overarched by a dome covering an area of nearly two acres, with a single canopy of limestone, without seam or flaw. The absolute stillness of the place is appalling, as the writer found when left alone there at midnight last summer; and when, as an experiment, he extinguished his solitary lamp, the silence and darkness were insupportable. The entire length of the Main Cave is about three miles, not counting side avenues, and it is interesting for its Indian relics as well as its scenery.

The lowest level is about 250 feet below the entrance to the cave, and here is the gathering-bed of the waters, which descend through the surface sink-holes and the interior pits. The River Region is reached in three ways: by the Corkscrew, by Fat Man's Misery, and by Ganter Avenue. The latter is an extremely narrow and tortuous tunnel, 8500 feet long, beginning near the Giant's Coffin and coming out beyond the rivers. The usual path is through the Fat Man's Misery, so annoying to portly people, but which is only 236 feet long, and opens this side the waters. Many who go in one way come out another for variety.

River Hall extends for many miles, if we consider the ramifications of the subterranean streams. In the rainy season we have seen all the streams united in one body of water fully 80 feet deep, and sweeping along with a strong but silent current. Ordinarily there are several large pools, or rivers, called the Dead Sea, Lake Lethe, Echo River, Roaring River, Mystic River, etc. The largest, and by far the most interesting, is the Echo River, which is from half to three-quarters of a mile long, and is famous for its remarkable reverberations of sound. There are three landing-places, where visitors embark on rude flat boats. The long vault has a keynote of its own, which, when firmly struck, excites harmonies of incredible depth and sweetness. Those who try their voices find them prolonged for some time after the impulse. When the guide violently agitates the water, it seems as if a concert of bellringers had begun, followed by the chimes of cathedral bells, after which come whimsical cries, and ghostly mutterings, the whole performance lasting for half an hour if well managed.

Silliman Avenue, Serpent Hall, Rhoda's Arcade, El Ghor, and numerous other passages and chambers, have their attractions. But the most wonderful of all are those found amid the crystalline conservatories of Cleveland's Cabinet, Paradise, and Portia's Parterre. Here we find a very treasure-house of alabaster gems. Imagine symmetrical arches of 50 feet span, where the fancy is at once enlivened by a mimicry of every flower that grows. These cave flowers are in reality curved crystals of gypsum. About five miles from the entrance the cave ends in Croghan's Hall, named for a former owner. The pit called the Maelstrom is here, and those who have dared to descend it say that avenues open out from its bottom.

Mammoth Cave is, in fact, not one cavern, but a congeries of caves and grottos, whose walls and floors have been worn away by aqueous agencies. Hence it is impossible to tell where this congeries ends; for the next blow of the hammer might open into some vast hall or long avenue. The usual estimate is that if all known passage-ways were placed end to end they would form a tunnel 150 miles long.

H. C. Hovey.—*Journal of School Geography*, 1897.

By permission of Professor R. E. Dodge.

North Carolina

North Carolina lies midway between the latitude of Lake Erie and the Gulf of Mexico. The extreme western portion of the state, beginning with the Great Smoky range, occupies the greatest width of the Appalachian highlands, and includes the highest peaks of the Appalachian mountain system. Thence it stretches eastward a distance of 500 miles to the Atlantic Ocean.

The surface of the state is naturally divided into three parts: the western or mountain section, the middle section or hill country, and the eastern section or low country.

The eastern section lies along the sea coast, and extends westwards to the hill country, a distance of from 100 to 125 miles. It is a broad plain, generally level throughout, rising gradually from the sea to a height of about 300 feet along its western border. In its extreme western part it attains a height of about 500 feet. The tide-water section comprises the lower part of this plain, which extends up to the head of the tides. Here the surface is almost a perfect level, having a rise of less than one foot in a mile. Near the southern end of the tide-water section the Wilmington and Weldon Railroad has a stretch of 40 miles, where there is neither curve, excavation, nor embankment. As the rivers at the tide-water section approach the ocean they gradually broaden out into shallow seas, which are known as sounds. The largest of these sounds are Pamlico and Albemarle. Pamlico Sound is about 75 miles long and from 15 to 20 miles wide. The sounds are separated from the ocean by a barrier of sand, which extends along the whole eastern border of the state, a distance of over 300 miles. Numerous inlets connect the sounds with the ocean, and divide this barrier into a number of long and narrow islands called "The Banks." The waves rolling in from the sea break when they strike shallow water, and deposit the sand that they hold in suspension. The inflowing tides have also set back the rivers, quieting their waters and causing them to deposit the detritus brought down from the land. In this way the banks have been built. These banks, or islands, vary in breadth from a few yards to 2 miles; in length, from 2 or 3 miles to 50 miles; and in height, from a few feet to 25 or 50 feet above the level of the sea. The vegetation here is scanty, consisting mainly of a few stunted trees, scattered over the more elevated parts, and grass, which grows sparingly all over the islands. A few miles north of Nag's Head there are forests of long-leaf pines which will compare favourably with any on the mainland. South of this point the trees are palmettos, stunted pines, and live-oaks. The fig, which is common on Ocracoke Island, attains here a size greater than on the mainland, and equal, perhaps, to that of any other tree on the island. The inhabitants of these islands, who are called Bankers, live mainly by fishing. Whales are occasionally seen along the coast, and hardly a season passes without one or more being harpooned. Many flocks and herds of sheep and cattle are owned by the Bankers. Herds of wild ponies roam over the island and feed on the coarse grasses of the salt marshes. "Pony Pennings" are held every year, when the ponies are driven together and branded with the mark of some proprietor.

The middle section extends westwards from the low country to the foot of the Blue Ridge, a distance of about 200 miles. The ascent from the eastern section of this middle region is about 200 feet in 2 or 3 miles, and is marked by falls, or rapids, in all of the rivers. The monotonous landscape of the low country is left behind. Here we have hills, dales, and rolling uplands.

The western section extends from the base of the Blue Ridge on the east, to the crest of the Great Smoky Mountains on the west. These two mountain chains cross the state from north-east to south-west. In Watagua county their crests are only about 15 miles apart, but they diverge toward the south-west until the distance between them is something over 50 miles.

The Smoky Mountains have an average elevation of 5000 to 6000 feet above the sea. This is the greatest of all the mountain ranges in the Appalachian system. It has many names applied to it at different points along its course, as Stone Mountains, Iron Mountains, Unaka Mountains.

Notwithstanding their massiveness, the Smoky Mountains are cut in seven places by rivers, which take their rise on the western slope of the Blue Ridge, and flow into the Tennessee. These water-gaps or gorges are from about 3000 to 4000 feet below the mountain tops on either side, and some of them have nearly perpendicular walls to a height of 1000 feet.

C. COBB.—*Journal of School Geography*, 1897.

By permission of Professor R. E. Dodge.

South Carolina

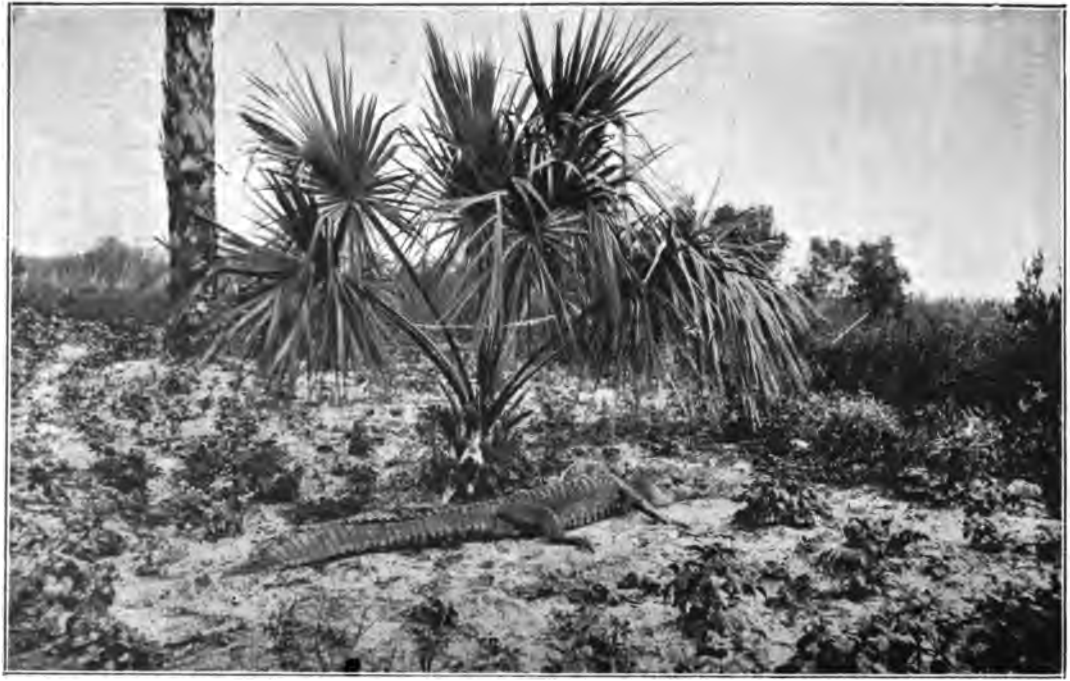
South Carolina has the shape of a somewhat irregular triangle, whose base extends 200 miles along the Southern Atlantic coast, and whose blunted apex rests upon the summit of the Blue Ridge, 300 miles to the north-west. It has the same latitude as Morocco, Algiers, or Japan.

The state stretches across two great topographic belts, the coastal plain and the piedmont plateau. The piedmont plateau embraces a third of the area of the state. Over most of the region its surface is gently rolling, but along the main streams it becomes hilly and much broken. There are a number of small isolated peaks in the middle and outer part. In the portion of the plateau the chains are larger and more numerous. The Blue Ridge escarpment, separating the piedmont and Appalachian regions, forms part of the north-western boundary.

The coastal plain, which skirts the Atlantic and Gulf coasts, attains a width of almost 150 miles. Swamps constitute a good portion of the coastal plain, their area being estimated at 5500 square miles. Those along the rivers are usually several miles wide. Near the coast they merge into the salt marshes, that are flooded at high tide.

The fox, racoon, opossum, squirrel, rabbit, mink, and musk-rat, with thrushes, wrens, sparrows, hawks, quail, and many other birds, range over the entire state. In the mountains are also found the deer, the bear, and an occasional wolf. In the swamps of the low country the deer, the bear, the otter, and the rice-bird, known in the north as the bobolink, are found; while the rivers of this region contain the alligator, the sturgeon, and many fodd fish.

In the low country the palmetto, the magnolia, bay, long-leaf pine, live-oak, cypress, juniper, Spanish moss, yellow jasmine, and many other trees and plants characteristic of a warm or semi-tropical climate, abound. On



IN A SOUTHERN SWAMP—ALLIGATOR AND PALMETTO.

the piedmont these are replaced by the short-leaf pine, oak, hickory, poplar, maple, and other hardwood trees. On the mountain sides hemlock, white pine, walnut, laurel, rhododendron, and other trees characteristic of more northern regions, are found.

Forests of cypress and long-leaf pine cover a large portion of the low country. Formerly the gathering of naval stores from the pine forests was an important industry. Now most of the forests have been worked, and the production of turpentine and resin is steadily decreasing. Lumbering, however, is becoming more and more important. Lumber, staves, shingles, masts, spars, cross-ties, and telegraph poles, are shipped to home and foreign ports in large quantities. In addition, the long gray moss is made into an upholstering material, and the pine needles are manufactured into a substitute for hemp and jute. On the piedmont the short-leaf pine and hard woods are cut for lumber, and supply the material for the wood-working factories of this region.

The location of most of the towns and cities of the state shows plainly the determining influence exerted by the physiography. The location of Beaufort, Port Royal, and Georgetown was determined, like Charleston, by the existence at these points of drowned river-mouths forming harbours where immigrants might land in safety, and through which alone the commerce of the colony with the outer world could pass.

The founding of towns at these places was the natural result. Fortuitous conditions helped to give Charleston the lead, and have thus enabled her to overshadow her sister coast towns.

As settlers pushed into the interior the rivers afforded the best means of ingress. As far inward as they were navigable—that is, to the inner edge of the coastal plain—they became the highways of communication with the coast. Along them settlements were made, towns were founded, and early commerce developed.

It was even more natural that when the inner limit of navigation had been reached, towns should there spring up through which the tide of immigration into the country beyond should flow, and which would receive the commerce developed thereby.

It happened in South Carolina, as everywhere on the Atlantic border, that a line of falls coincided with the inner limit of navigation. These furnished excellent sites for mills. Hence such places were possessed of both manufacturing and commercial advantages. The location of Hamburg, Columbia, Camden, and Cheraw was a natural result. All throve while the rivers were the only highways of commerce. But, with the introduction of railways, pre-existing conditions were changed. As a result of adjustment to these new conditions some of them are growing to-day, while others have either declined in size and importance or have been barely able to hold their own.

On the piedmont plateau the conditions were different. The rivers were no longer navigable, and so could not offer this inducement for the location of towns upon them. The best town sites were furnished by the level interstreams areas, and nearly all of the piedmont towns are located upon these areas, away from the rivers, and often upon the very partings between them. Occasionally, however, falls giving manufacturing advantages would determine the location of a town upon a river.

L. C. Glenn.—*Journal of School Geography*, 1898.
By permission of Professor R. E. Dodge.

The Rice Lands of South Carolina

The lowland scenery of South Carolina is as varied as tropical. From the sea the marshes, or savannas, stretching 70 miles back from the coast, seem perfectly level; but there are in many places bluffs crowned by delicate foliage. A vast panorama of fat meadows, watered by creeks,—of salt and fresh marshes; of swamp lands of inexhaustible fertility, from which spring the sugar-cane and cypress; of rich, firm soil, where oak and hickory stand in solid columns; and of barrens studded with young pines,—salutes the eye.

The innumerable branches which penetrate the low-lying lands from the sea have formed a kind of chequer-work of island and estuary. The forests along the banks of the streams and scattered between the marshes are very beautiful.

In the spring jessamine and cherry fill the air with the perfume of their blossoms; in winter the noble oaks, in their garment of moss, and the serried pines, preserve the verdure other trees have lost. When the rice plantations are submerged, and the green plants are just showing their heads above the water, and nodding and swaying beneath the slight breeze, the effect is indescribably beautiful.

E. KING.—*Southern States of North America.* Blackie.
By permission of Messrs. Blackie.

Growth of Cotton Manufacturing in the Cotton States

The American cotton states can no longer be regarded merely as cotton-raising states, as they are yearly increasing the extent of their facilities for manufacturing the staple. Many new enterprises have been established on a large scale for cotton manufacturing in the upper part of South Carolina, North Carolina, and Georgia. Most of the mills are run by water power, of which there are vast undeveloped quantities available in the belt of land 30 to 60 miles wide, forming the eastern watershed of the Blue Ridge mountain range, and extending from Virginia southward through the three states named to Alabama.

All of the cotton mills in the New England states combined have not as much water power as is available in South Carolina. There are in the piedmont region of the state three great water powers, with many smaller ones still undeveloped, one of which, at Landsford on the

Catawba River, is susceptible of developing power to work 10,000 to 15,000 looms and hundreds of thousands of spindles.

With reference to the future of the cotton manufacturing industry in South Carolina, it appears to be the inevitable tendency of the times for mills to come to the cotton-fields. As yet the Northern operatives are able to turn out more product than the Southerners, as they have had longer experience at the work and are more skilful. The cost of labour, however, is cheaper in the south, and the southern mills enjoy the further advantages of cheaper lands, closeness to building material, and proximity to the cotton-fields, as is illustrated in the case of one of the most typical southern mills at Newry, South Carolina. The site of this mill was primeval forest a little over two years ago. It contains 16,500 spindles and 540 looms. Its annual consumption of cotton is raised within a radius of 20 miles of the mill, farmers bringing it direct to the mill in their own waggons, this being the only step from the cotton-fields to the spindles, with no middleman handling the raw material:

British Consular Reports, 1896.

The Everglades of Florida

The peninsula of Florida naturally separates into three divisions—the middle portion, which comprises the beautiful lake region; the west coast, which slopes away from the high ridge to the Gulf of Mexico; and the east coast, whose sandy levels are protected from the Atlantic by the great Coquina atoll, extending from the mouth of the St. John's River to the shores of Lake Worth.

The Everglades consist of two great basins lying between Lake Okeechobee and the extreme southern point of the peninsula. The floor and rim of these basins are formed of a limestone which is doubtless a continuation of the rock composing the central ridge or backbone of the state. On the edges or rim, where the rock is exposed, it presents a very singular appearance. Here it is weathered and water-torn into the peculiar shapes which gave rise to the early opinion that Florida was of coralline formation. The pressure of the floods of water pouring over the sides or through the edges of this rim has worn away the softer portions of the rock, leaving the harder substance to present a somewhat coral-like structure. The colour varies from cream to dark brown, owing to the black water, so called, which issues from the glades. The rock not only persists throughout the glades, so far as explored, but seems also to be present in the river-beds to the south, through which the water of the glades finds an outlet. To the north the water empties into Lake Okeechobee; to the west, south, and east it flows through various rivers into the Atlantic and Gulf. The evident elevation of the area above the east, west, and south coasts precludes the idea of drainage from surrounding areas, and we must look elsewhere for the sources of the water. These, I think, are found in part in precipitation, and in part in subterranean streams and springs.

Approaching the glades from either east or west, the water gradually deepens, the rock forming the floor of the basin receding toward the middle at the rate of about 8·6 inches to the mile. In the valley thus formed, running north and south, the rock is about 15 feet below the surface. Immediately over the rock is deposited the result of ages of decayed vegetation, forming a soft peat or muck, the depth of which varies from a few inches to five feet. It is everywhere present over the floor of the great basins, and if ever drained will afford a soil of incalculable richness and fertility.

For miles east and west from the valley of the basin, and north and south through its length, there stretches an almost impassable prairie of saw-grass. This saw-grass, rooted in the muck, grows to enormous size, and in many instances resembles a bamboo pole of the size of an ordinary fishing-rod, with a continuous barbed-wire covering. On three sides of the grass grow teeth of singular sharpness, sometimes an inch in length. Through this prairie of saw-grass clear waterways are found here and there. Their direction is generally southward, and any attempt to cross the glades from west to east is attended with great hardship and difficulty. For the white man the passage of the glades means wading, poling, and portage, not infrequently through the densest of the grass, through which he sometimes has to blaze his way. The Indian, who has time on his hands, accommodates himself to the provisions of nature: he follows the path of the open waters, and through years of experience has learned the apparently trackless way to his homestead or to the outside world. For eight or ten miles on either edge of the glades the conditions change materially. Thousands of islands, varying in size from one-eighth of an acre to several acres, greet the eye. On these islands the soil is phenomenally rich, and giant ferns, the fronds of which measure 12 feet in length, grow upon their edges. The virgin forest is composed of the wild lemon, wild cucumber, and wild orange, the dogwood, the custard-apple, the prickly ash, and hundreds of other varieties. Overhead the myrtle and the morning glory mingle in tangled masses with countless varieties of tropical vines.

J. N. MacGonigle.—*National Geographic Magazine*, December 1896.

By permission of the National Geographic Society.

General Features of American Cities

American cities are for the most part constructed on mathematical principles. Washington, for instance, is laid out after the fashion of a wheel, with the Capitol for the centre, and broad avenues for the spokes. The newer parts of New York are formed of straight lines and right angles. Chicago, the real wonder of America, has been treated in the same manner. The straight lines of the principal streets, coupled with the square and lofty character of the buildings on each side, have a bewildering effect on the stranger. Broadway, New York, as most people are aware, is a thoroughfare of immense length. It is, I believe, from end to end, somewhere about six miles long. Yet few but a native would be able to tell on first striking it whether he was on the upper end or the lower, except from the numbers on the houses and shops. The same difficulty besets the stranger in Chicago. I was never able to tell whether I was on Dearborn Street or Clark Street, Monroe Avenue or Washington Avenue, till I could distinguish the name on the public lamps at the corner.

Our cousins seem more anxious to exhibit than to conceal the good things they possess. If they place any fences at all round their lawns and gardens, it is a mere wooden rail which any child can step over. The general practice is to leave everything as open to the public as it is to the proprietor. Lawns and gardens stretch down to the sidewalks in precisely the same way as the grass plots in our public parks to the gravel paths. Even some of the parks, as in Chicago, run along the side of the roads without any railings. One can easily understand how much more pleasant the residential part of an American city is than a similar district in an English town.

The municipalities accept it as part of their duty to adorn and beautify the thoroughfares. Avenues and boulevards are everywhere constructed out of public funds. So much is being done to beautify the outlying parts of Chicago that many miles of the loveliest boulevards in the world have been constructed. New Haven, in Connecticut, known also as the Elm City, from the East Rock gives one the impression of a town planted in a forest. The same impression is produced when looking down upon the city of Rochester. Cleveland and Detroit are also reputed for comeliness and verdure. To my fancy, however, there is no prettier town in either Europe or America than Milwaukee. Its charming drives, its shady walks, its lawns and flower gardens, none of them enclosed, make it impossible to imagine that one is not strolling through a public park, instead of threading the streets of a thriving and industrious community. Situated on the shores of

Lake Michigan, the Cream City of the West, so called from the colour of the bricks of which much of it is built, commands a view of one of the loveliest bays any traveller could wish to look on.

W. H. ADAMS.—*Our American Cousins.* Walter Scott.
By permission of Mr. Walter Scott.

New York a Century ago

New York with great propriety may be called the commercial capital of the world. Ere long it will be on the coast of North America what Tyre once was on that of Syria. In her port are the ships of all nations; and in her streets the displayed merchandise from all parts of the known world. And then the approach to it is so enchanting; the verdant fields, the woody hills, the farms and country houses, form a beautiful landscape as you sail up to the City of New York.

Broadway is the principal street. It is 3½ miles long. I am at a loss to know where to look for a street, in any part of the world, which has so many attractions as this. There are no steam-engines to annoy you by filling the atmosphere full of soot and smoke; the houses have a stately appearance, while the eye is relieved from the perpetual sameness which is common in most streets by lofty and luxuriant trees.

New York has very great hotels and genteel boarding-houses; all charges included, you don't pay above two dollars a day, little enough when you consider the abundance of food.

In this city, as well as in others I visited, everybody seemed to walk at his ease. I could see no inclination for jostling, no impertinent staring at you; no attempts to create a row in order to pick your pocket. I would stand for an hour together in Broadway to observe the passing multitude. There is certainly a gentleness in these people both to be admired and imitated.

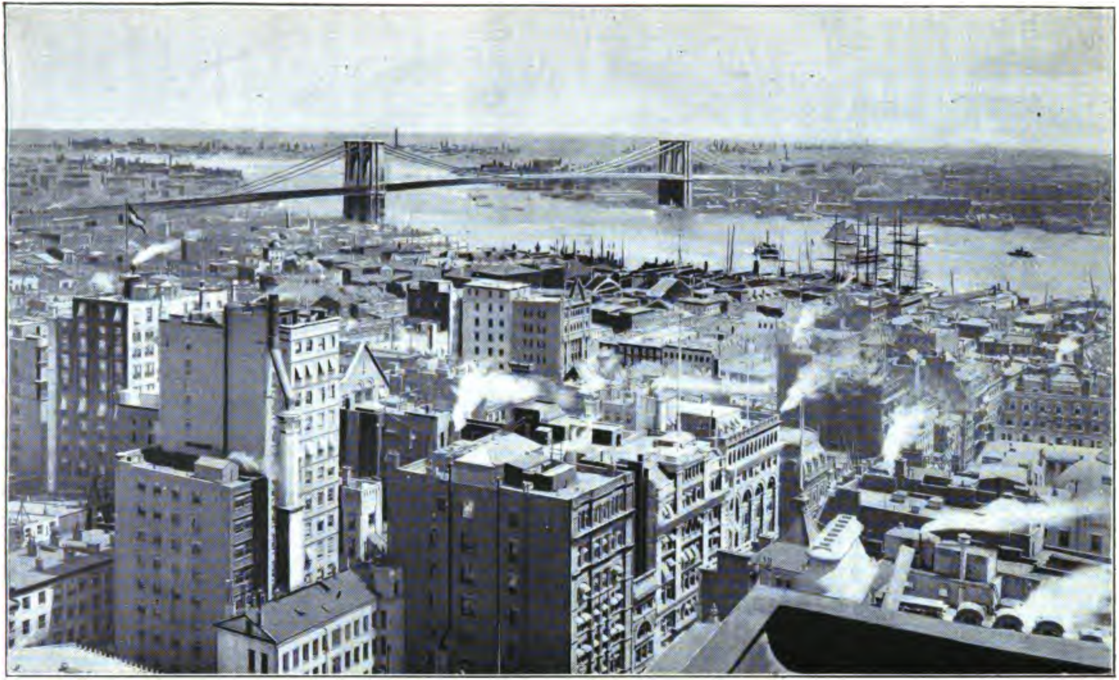
C. WATERTON.—*Wanderings in South America.* Macmillan and Co.

New York To-day

New York, the principal city of the United States in point of wealth and population, lies mainly on Manhattan Island. The street called Broadway runs for several miles along the crest of the island, forming the central thoroughfare, from which streets spread with some regularity to the water on each side. The leading thoroughfares originally followed the lines of the shore, along which the earliest buildings were chiefly erected, the central ridge being the last to be occupied, until the city reached what is now known as Wall Street, the side of which was marked by a rampart and stockade extending from river to river across the island. Within this space the streets were laid out as convenience dictated or as old pathways suggested.

In 1807 the present plan of the city was adopted, with its broad longitudinal avenues crossed by side streets at right angles. The erection of buildings along these streets has led to the levelling of the region below the Central Park, but in the park the varied outline which once characterised the whole island is still retained. The precipitous banks of the Hudson River at the upper end have also compelled a treatment in which the original configuration of the ground is preserved, and the streets and roadways are adapted to it. The city in its growth northwards has absorbed several suburban villages.

As the dwelling-houses became further and further separated from the business part of the city, the discomfort and delay of travel by tramway, especially in winter, grew very serious. The remedy was applied in 1878 by the construction of what is known as the Elevated Railroad, worked by steam locomotives on raised iron trestle-work, and running from the Battery, or southernmost point of Manhattan Island, to the Harlem River every three or four minutes. The result has been a very rapid increase of population in the upper end of the island. The Brooklyn Bridge, connecting New York with Brooklyn on Long Island, is the largest suspension bridge yet constructed,



NEW YORK.

measuring 5989 feet in length. The width of the bridge is 85 feet, divided between five passage-ways. As the city is surrounded on all sides by water, ferry-boats form the principal means of communication between it and the opposite shores. The water-courses of its northern boundary—Harlem River and Spuyten Duyvel Creek—are narrow enough to be bridged; but until the opening of the Brooklyn Bridge in 1883, ferry-boats supplied the only means of communication with New Jersey and Long and Staten Islands.

E. L. GODKIN.—*Encyclopædia Britannica.*—A. and C. Black.
By permission of Messrs. A. and C. Black.

Philadelphia

Philadelphia stands, and necessarily stands, on the straight, ruler-like "Falls line," which passes through every city site from New York to Montgomery, because this prodigious slip changes river navigation wherever it crosses a river valley. Where marine navigation stopped to-day, and then, Penn put his city, its site a peninsula about which two rivers joined, a rich alluvial plain, covered with glacial clay, with schistose rocks cropping out across it, the palæozoic marble of the Atlantic coast hard by, and a strip of green serpentine crossing the country from the highest points in the future limits of the city to Chester County, its first granary and feeding ground. These things, the half-sunken Delaware River spreading into Delaware Bay, the term of navigation at the junction of the two rivers, and the abrupt approach to the sea of a formation elsewhere miles from the ocean, make Philadelphia all it is in outer look—a flat city built of its own clay, garnished with its own marble, a seaport knowing the sea only in its own rivers.

In this inland port, as you float in either river, seafaring masts and main rigging, black and tarred, silhouette against the tender green of growing fields. The early houses were brick of the glaciers' leaving, matching

London in colour; for both are ground out of the same earth-mill. Its early storehouses were of the narrow contorted grey schists, and marble quarries had been opened, exhausted, and closed to trim the brick before the Revolution. Later these were varied by the green serpentine, a hideous, dull colour, the red sandstone of the fertile inland plains, and, at last, as railways made it easy to seek a doorstep 1000 miles away, the marble of Vermont built the City Hall, the granites of Cape Ann the Post Office, and Ohio ashlar a growing number of private homes, matching London once more as a close congener of the Portland stone Penn saw builded into St. Paul's. The outer resemblance to London, noted by Matthew Arnold and many a one besides, rests, as such things do, on concrete fact.

WILLIAMS.—*Historic Towns of the Middle States.* Edited by L. P. Powell. G. P. Putnam's Sons.

By permission of Messrs Putnam.

For Boston, see p. 223.

Washington

We reached Washington at sundown. The last rays of the sun were striking on the massive dome of the great marble Capitol, and we were fairly fascinated. So grand a sight was it that all Washington seemed naturally to merge in the Capitol.

Washington is a unique city. The life-blood and sole vital principle of the place is politics, *i.e.* in the wide sense, as embracing not only the Legislative Assemblies, but also the various departmental functions of government. Many of the population are employees in these departments.

In no American city so much as in Washington do the magnificent and the mean stand in such striking juxtaposition. Close beside splendid Government buildings cower the paltriest of houses and most miserable of shanties. Washington has well been named the City of Magnificent Distances. If the city can be filled up

WASHINGTON, THE CAPITOL.

according to the present ambitious plan it has a future of splendour before it, and will vie with any European capital.

The great attraction centres in the Capitol. This remarkable building is all of white marble, to which, equally with its size and perfect architecture, it owes its magnificence. Its area is vast, and the grandeur of its architecture lies in its simplicity. We climbed the dome, a height of 200 feet, by an ascent of 300 steps, and had a far-spreading view around; but the prospect could not justly be called beautiful, owing to the extreme flatness of the country. On the top of the dome is a bronze statue of Liberty, 18 feet high without its pedestal, which reflects the beams of the sun so as to appear from a distance like a dazzling spot of fire.

The White House is the residence of the President. Like the Capitol, it is of white marble; it is long and rather low, with massive columns at the doorway, and the façade is pleasing. It looks almost homely, yet withal it is dignified.

E. B. BERRY.—*The Other Side.* Griffith and Farran.
By permission of Messrs. Griffith and Farran.

Pittsburg

George Washington, the father of his country, is equally the father of Pittsburg, for he came thither in November 1753, and established the location of the now imperial city by choosing it as the best place for a fort. The young Virginian pushed his cautious way to "The Point" of land where the confluence of the Monongahela and Allegheny Rivers formed the Ohio. This, he declared, with clear military instinct, was the best site for a fort, and he rejected the promontory two miles below, which the Indians had recommended for that purpose.

In 1786 Pittsburg contained thirty-six log-houses, one stone and one frame house, and five small stores. Pittsburg was incorporated a borough in 1794. Her first glass-works were built in 1797; and both her population and her industries multiplied till she was made a city in 1816. In 1845 a great fire destroyed about one-third of the total area of the city, including most of the large business houses and factories.

Pittsburg now embraces in the limits of the county a population of over one million. Her share is more than one-half of the whole production in the United States of steel, steel rails, coke, oil, plate-glass, glassware, harness leather, and iron pipe. She mines one-quarter of the bituminous coal of the United States. She has 2500 mills and factories. Her electric street-railway system multiplies itself through her streets for 250 miles. Natural-gas fuel is conveyed into her mills and houses through 1000 miles of iron pipe. Her output of coke makes one train ten miles long every day throughout the year. Her tonnage by river and rail exceeds the tonnage by river and rail of any other city in the world: it is equal to one-half the combined tonnage of the Atlantic and Pacific coasts. Her rail tonnage is three times as large as that of New York or Chicago, double that of London, four times that of Paris, and greater than the combined tonnage of New York, Boston, and Chicago. Two hundred and fifty passenger trains and 6000 loaded freight cars run to and from her terminals every day. Her armour sheathes our battleships (U.S.A.), as well as those of Russia and Japan. She equips the navies of the world with projectiles and range-finders. Her bridges span the rivers of India, China, Egypt, and the Argentine Republic; and her locomotives, rails, and bridges are used on the Siberian Railroad. She builds electric railways for Great Britain and Brazil, and telescopes for Germany and Denmark. Indeed, she distributes her varied manufactures into the channels of trade all over the earth.

S. H. CHURCH.—*Historic Towns of the Middle States.* Edited by Lyman P. Powell. 1899. G. P. Putnam's Sons.

By permission of Messrs Putnam.

Savannah

There are vaster and wealthier cities, but for architectural simplicity and natural beauty there is but one Savannah. By taking up our abode in this little fertile forest, with its rectangular rows of cheerful residences reposing beneath tall pines and sycamores, live-oaks and magnolias, with here and there a palmetto or cypress tree, and then by starting from this centre and radiating about Georgia, we shall explore a state about whose soil and climate, productions, and resources, the half has never been told.

Being but 18 miles from the sea, it is naturally the emporium of the vast tracts of land traversed by the river and its tributaries; it consequently enjoys a greater command of navigation than any other city in Georgia. Of the vessels visiting this port a large proportion are steamers running regularly between Savannah and New York, Philadelphia, Boston, and Baltimore; while along the 5 miles of wharfs European ships of vast dimensions and various nationalities are to be seen every winter taking in heavy cargoes of cotton, lumber, and naval stores for transhipment to foreign ports.

Georgia's most valuable crop is cotton. The ripe seeds of the cotton plant are enveloped in a mass of woolly hair of snowy whiteness; and so minute are the fibres that it has been calculated that in American cotton there are no less than 140,000,000 filaments in a single pound. In the production of sea-island cotton, or the long-twisted staple, Georgia claims almost the monopoly; in upland cotton she ranks third, only Texas and Mississippi being ahead. In 1850 the crop of this one state was 500,000 bales. Soon it will be a million, for every year additions are made to the cotton area. In rice Georgia is second, the lead being taken by South Carolina.

Rev. T. Harley.—*Southward Ho.* Sampson Low.

By permission of Messrs. Sampson Low.

VI. THE CENTRAL PLAIN

Minnesota

In the exact centre of the North American continent lies a country nearly as large as France. By its eastward boundary sweeps the broad and majestic stream of the Mississippi, which rises in one of its northern lakes, and continues its long journey of more than 2000 miles, till, among almost tropical growths, and beneath a southern sky, the mighty river falls into the Gulf of Mexico. To the north lie the possessions of the British Crown, and to the south the vast grazing lands of Iowa. To the west, beyond the fertile valley of the Red River, is a region rich in agriculture and mineral wealth. A vast table-land, some 2000 feet above the sea-level, it has many of the characteristics of a mountainous district, though to the eye its general appearance is that of a wide park region, dimpled with wood-girt lakes, which dot in every direction the undulating plains of green, which stretch far away in endless vista to the far-off horizon, or tracked by broad timber-laden rivers, or shallow streams, which wind like silver threads through the rich river bottoms, flanked on either side by bold hills, clothed with luxuriant forest foliage. These were the old hunting-grounds of the Sioux and Chippewa Indians. Now cross roads intersect them in all directions, along which thriving towns have sprung up, and stretching away on either side one sees neat homesteads around which wheat-fields wave their golden ears in the wind as it rustles through the towering maize.

The summers have an almost tropical character, which forces vegetation with a rapidity and luxuriance unknown in our own island home. The winters are characterised by a clear and bracing cold. Lakes and streams freeze up towards the end of November, sometimes to a depth of several feet, to open again at seasons varying from February to April. Spring bursts forth almost instantaneously on the approach of May, and autumn is often prolonged late into November by the lovely Indian summer, when dreamy days of summer heat alternate with nights of frost. In the woods grow in wild profusion the fruits which flourish in English gardens. The wild raspberry and gooseberry and currant are found among the undergrowth of every forest, while the earth is carpeted in summer with beds of tiny wild strawberries.

At the head of the navigation of the Mississippi, on one of the most strikingly beautiful sites in the world, lies the capital of Minnesota, St. Paul, and 10 miles higher up the stream the great lumbering and flour-milling city of Minneapolis, which possesses in the picturesque Falls of St. Anthony the largest water-power in the north-west. Together these two cities form the twin capital of the state, rivals in beauty, enterprise, and wealth, and in all the elements of material prosperity. Year after year the interval between them is being gradually filled up by human habitations, and they will form, in a few years to come, but one vast metropolis on the banks of the great river.

M. FARRAR.—*Five Years in Minnesota.* Sampson Low.
By permission of Messrs. Sampson Low.

The Mississippi Valley

The valley of the Mississippi and its tributaries is the core of the Republic. It comprises, between the Appalachian Mountains and the Rockies, about 1,250,000 square miles, almost exactly one-third of the area of the United States. Within these limits are included nearly all types of soil and life that characterise the nation. The flanks of the valley rest in the extreme east and the far west; while in the north it touches the frozen clime of Manitoba, and in the south the great river empties among the semi-tropical foliage and fruits of Louisiana. There is the widest variety in its surface, including forest, prairie, and mountain, the richest soil and the most arid, great pastoral plains and closely tilled farm-lands. There is the same variety in the occupations of the millions of people who live in this vast area. There are farmers everywhere. There are miners in the east, in Illinois and Missouri, on the slopes of the western mountains, and on the shores of Lake Superior. There are lumber-men in Minnesota and Wisconsin, sugar-planters in Louisiana, cotton-planters in Mississippi, manufacturers and merchants in all the crowded cities.

The Mississippi is the great central artery of travel. From the head of navigation at Minneapolis to the Gulf there are 2200 miles of channel on which a steamboat can float. The two giant branches, the Missouri and the Ohio, penetrate the north-west and the north-east with 1253 and 1050 miles of navigable water respectively; and the innumerable smaller affluents of the main river and its tributaries provide a large part of the valley with easy means of transit.

But these innumerable navigable streams are not the only means of reaching the valley by water. All along its north-eastern slope lie the Great Lakes. This vast Mediterranean Sea of America reaches far into the heart of the continent, making navigation possible for large vessels from the Falls of Niagara to the shores of Minnesota. In the early days the settler from the east could thus readily reach his destination in Ohio or Michigan. If he then paddled or poled his boat up one of the streams that emptied into the lake, he could often by a short portage re-embark on the other side of the watershed and float down to the Ohio. Indeed, the elevation of the sources of the two sets of streams is so slight, and they are so intermingled, that it would in some cases be no great task of engineering to divert the waters of the one in the other direction. This is actually to be done at Chicago. A deep drainage channel will connect the Chicago River with the Illinois. This will cause the current to set from Lake Michigan, thus not only carrying southward the drainage of the great city, but at the same time affording what can hardly fail to be ultimately a ship canal connecting the lakes with the Gulf of Mexico.

The present advantage of the Great Lakes to the northern part of the Mississippi valley is enormous. Chicago, Milwaukee, Cleveland, Detroit, Duluth, have grown up from the traffic by water. Barges load at Buffalo and Cleveland with coal, and return with the wheat of Minnesota and the Dakotas, with iron and lumber from Wisconsin, or copper from Michigan. The commerce of the Sault Ste. Marie Canal is actually far greater than that of the Suez Canal.

Railways are abundant in the Mississippi states. From Chicago, Omaha, Minneapolis and St. Paul, Kansas City, Cincinnati and Memphis, they radiate in all directions. These are the creators of the great cities that dot the west. They give value to the farm-lands of Western Kansas and Nebraska. In the early days of the Ohio River settlements the farmer never thought of shipping his grain. He raised quantities of Indian corn, but it was so bulky, and transportation so slow and costly, that it was out of the question to haul it over the mountains and sell it in New York. The thrifty settler transformed his corn into hogs and these into bacon and hams, which he loaded in flat boats and floated down to New Orleans. Hog and hominy were his food and whisky his drink, all, in the last analysis, merely a form of the invariable crop of maize. Now the log cabin has become a substantial home. The farmer's diet is as varied as his agriculture, because the railroad has brought the market to his door.

Yet while the railroads have given this vast impetus to settlement and the creation of wealth, the waterways are by no means useless. Transportation by water costs less than by land, and so is much more profitable for all bulky articles. Lumber, coal, and wheat are largely shipped at lake and river ports. The lakes, rivers, and canals are still crowded with craft.

It has been objected by some that the Mississippi flows the wrong way. The Atlantic coast and Europe are the objective points of traffic of our western states. If the great river ran east instead of south, so that its mouth were at New York instead of at New Orleans, the volume of its business would be enormously increased. It does not pay to ship wheat to Europe through New Orleans; it takes too long, and the cargo has to pass through a hot climate that hurts and injures the grain. This no doubt is true. However, while the Mississippi is of less importance relatively than before the great extension of railroads, it even now plays an important part in the business life of the west, and it seems more than likely that in the near future its importance will be vastly increased. The commerce of Asia has largely increased the wealth of Europe, and when the Nicaraguan Canal is completed a direct and short water route to China and Australia will at once be open to the Atlantic ports. The Mississippi pours its flood into the Gulf in almost a direct line for Nicaragua. New Orleans and St. Louis will be nearer Hong-Kong than is New York; and the Michigan Ship Canal will enable vessels to load at Chicago direct for Sydney or Canton.

JUDSON.—*The United States of America,* vol. i. chap. v. Sampson Low.

By permission of Messrs. Sampson Low.

Chicago

There are several towns in the United States where butchering is the chief industry and source of wealth. Chicago, the most famous, has, during the last thirty years, developed with the most unparalleled rapidity. Neither Pittsburg, the iron city, nor Denver, the great mining centre of the Rockies, has attained such success in so short a period, and it is on the wholesale slaughter of cattle and pigs that the prosperity of the city is based.

All situations are not equally good for these vast dead-meat emporiums. They must be at the entrance of the stock-raising country for convenience of supply, and in easy communication with the shipping ports for the European trade. Hence the meat cities are shifting west as the stock-raising lands move west with the development of colonisation. In 1850 Cincinnati was at the head of the industry, and was long known by the significant name of Porkopolis. Chicago was hardly born, but later it entered on the scene with Louisville, St. Louis, Indianapolis, and Milwaukee, all of which it rapidly outstripped. To-day its rivals are Kansas City and Omaha: to-morrow, probably, some yet unknown Texan town will count among the great meat cities.

Chicago is not merely the greatest packing-house: it is also the greatest railway centre. Fifty-one tracks, owned by thirty-two different companies, radiate from Chicago to all parts of the United States, from the Atlantic to the Pacific, and from the Gulf of Mexico to Canada.

Chicago was destined by its geographical position to become a great transport centre, even before the days of railroads. Situated at the extremity of the great hollow that forms Lake Michigan, it was the most northerly point by which a traveller could pass from New York to the north-west, and when the north-west began to be peopled, Chicago was evolved in due course. Lake Michigan gives it a valuable opening to the north, and the Mississippi is so near that, by the aid of a canal, which was not difficult to construct, the southern states can easily be reached by that grand waterway. But though no other point combines so many natural advantages for becoming a railway centre as Chicago, yet an accidental circumstance greatly accelerated its rate of development. In the middle of the War of Secession, St. Louis, the key of the Missouri valley, declared for the South, thus cutting off the north-west from the Atlantic coast. The situation was a critical one.

It was met by the construction of railroads on a scale destined to make Chicago the pivot of commercial life and the capital of the west. St. Louis rapidly waned, and by the end of the war the centre of America had already shifted.

The rise of Chicago contributed in a remarkable degree to the growth of the north-west. In 1860 St. Paul was only a little town, and Minneapolis did not exist. To-day each has nearly a quarter of a million inhabitants.

PAUL DE ROUSIERS.—*La vie americaine.* Firmin Didot.

Distribution of Towns in Missouri

The towns and villages in Missouri are distributing points for agricultural communities. The only exceptions to this are the very few villages supported by mining industries, and a few lumber towns. There is not a village in Missouri whose inhabitants derive their support entirely or even in large part from manufacturing industries. The location of the villages was determined by the location of a large body of good farming land. Where, as in the prairie region, practically all the land is capable of producing good crops, the location became merely accidental, or else had some relation to transportation facilities. Before the advent of the railway, the waggon roads, the only routes of travel excepting the rivers, ran at will over the prairies. The location of a road was determined by chance, by the homestead of some pioneer, or by an Indian trail. The earlier settlements were located along the larger streams, and the roads, being free of natural obstructions, usually took the shortest route between them.

The most important factors determining the location of the settlements along the streams in Northern Missouri were the abundance of water and timber. The settlers had come from a wooded land of surface streams, and had not learned the art of water storage, nor had the coal deposits of the state yet become available for fuel. Timber was needed for fencing as well as for fuel. Live stock roamed at will over the unoccupied land, so that a strong fence was a necessity. Wire fencing was unknown, and hedges required several years to become heavy enough to turn stock.

In southern Missouri the uplands, as well as the valleys, were forest-covered, but in this part of the state the upland soils are really very much less fertile than the valley soils. The problem of water-supply was the same here as in Northern Missouri.

The largest towns and villages were, of course, located along the trunk line of navigation, the Missouri River. The Missouri River flows through a flat, alluvial plain, several miles in width, which, during extremely wet weather and high-water stages in the river, is very difficult to traverse on account of the mud, and the deep sloughs and channels of water which abound over its surface. The river winds through this plain in a tortuous course, sometimes striking the bluff at one side of the valley, at others remaining for a long distance far within the plain and out of reach from the uplands.

When a stream washes the foot of the bluff on one side of the valley it forms a natural communication with the regions of the interior. The towns and villages of the early settlements, and, indeed, every town of any importance in Missouri before the Civil War, was located at such a place. Such were Cape Girardeau, St. Genevieve, Grand Tower, St. Louis, Hannibal, Louisiana, St. Charles, Jefferson City, Boonville, Glasgow, Lexington, Kansas City, Weston, St. Joseph, and Forest City. Independence was not exactly on the river, but its shipping station was at Wayne City, a few miles north, and located like the others just mentioned. Independence was the starting-point for the great waggon trains to Santa Fé and the Far West. The steep hillsides of a bluff town were not suitable for developing the large teams of oxen with which the waggons were drawn, so that the town was located on the uplands, about three miles from the river.

With the advent of the railway in Missouri the valleys began to decline in importance. The river transportation declined rapidly, so that within a few years after the Civil War steam-boating on the Missouri had become a thing of the past. It is now wholly abandoned, excepting for extremely local traffic. On the Mississippi River it is still of considerable importance.

The railroads in the prairie regions of Missouri follow the uplands with very few exceptions. If a valley is to be crossed it is done as quickly as possible. In very few cases had the previous location of towns and villages anything to do with the location of railroads. The towns did not depend upon any fixed industry, so that the railroad disregarded them. The railways then became the trunk lines of traffic, and attracted the commercial population to points along their lines. Along with the migration of the commercial population of the villages to the railways there was a corresponding movement of the agricultural population, or at least a more rapid occupation of the uplands. Within a few years the population of the uplands had far outgrown that of the valleys in wealth and influence. Many old towns that were flourishing trading points before the railroads were built are now almost extinct. Where the old river towns were fortunate enough to get a railway they have been saved from decay, but in many cases their growth, even under the new conditions, has been slight.

C. F. Marbut.—*Journal of School Geography*, 1897.
By permission of Professor R. E. Dodge.

Louisville

Louisville is situated on the Falls of the Ohio. These are, more properly speaking, only rapids formed by a flat ledge of limestone rock which dams the stream at this point; and as there is no sudden pitch on the north side of the river, they are navigable when the water is high enough. This topographical feature attracted the clear-sighted pioneers in Kentucky as a place likely to become a great city, because of the obstruction to navigation and the necessity of portage. It was the natural port of the upper Ohio, and the head of navigation for the lower stream.

The prosperity of Louisville to-day rests largely on its tobacco trade, as it can claim the distinction of being the chief leaf tobacco market in the world. The State of Kentucky produces nearly 50 per cent of the American crop, and a much larger proportion of the western planting; for this reason Louisville is as much the natural centre geographically for the leaf trade, as New Orleans for cotton, or Chicago for wheat. The tobacco trade of Louisville received a powerful impetus in the early seventies, with the extraordinary development of the white Burley crops, a superior kind of tobacco raised chiefly in the Blue-grass region of Kentucky.

Louisville is the chief centre in the state for the distribution of fine Kentucky whisky. There are at present in the city nineteen distilleries, most of them of large capacity. For the manufacture of whisky Louisville has in common with other points in the state the advantage of proximity to the great corn, rye, and barley lands of Kentucky, Indiana, Illinois, and Iowa. An important element in the quality of whisky is the water from which it is made. The whiskies having the greatest reputation are those which have been produced from water percolating through the Birdseye limestone which outcrops on the Kentucky River near Frankfort. An eminent authority claims that the superior quality of the Kentucky whisky is due to the local yeast germ, which is a product exclusively of this region.

Proximity to great grain lands accounts also in part for the active brewing and malting industries of Louisville, and her large flour mills. These interests, together with the manufacture of whisky, naturally create a demand for cooperage; while the forests of the Kentucky Mountains furnish an abundant supply of hard woods for this purpose. The making of white oak barrels for the whisky trade is an industry by itself, especially as a barrel can be used for this purpose only once. When the tannic acid in the wood becomes exhausted, the receptacle ceases to perform its function of rectifying the liquor. But the local markets do not exhaust the supply of cooperage in Louisville. Barrels are set up, their staves numbered, then knocked to pieces, stacked up, and in this compact form are exported to Mexico. The Kentucky forests also provide the raw material for the axe, hammer, and other tool handles which are manufactured here, and marketed all over the south and west. Furniture, chairs, and wood mantels have their factories here, also news and wrapping paper made from wood pulp. Its situation between the Kentucky forests to the east, and the great cattle ranges to the west, has won for Louisville the honour of being the foremost city in the country in the tanning of fine oak sole, belting, and harness leather. There are nearly a score of tanneries, the products of which are further worked up in the saddle, harness, and horse-collar factories, which form an important line of the city's industries. This is the most eastern point at which saddles are made in quantities, as the demand for these articles is almost limited to the south and west.

The industries of Louisville so far considered represent the efforts made to work up the chief raw materials produced in the region about; they are therefore a product of its environment from the standpoint of supply, and are quite distinct from another class which are equally a product of its environment, but from the standpoint of demand. To the south and south-west of Louisville, from the Ohio and Missouri to the Gulf, there lies a great agricultural area, for which she was from her earliest days distributing centre, and for which she is now manufacturing certain commodities. Ploughs and other agricultural implements, cane-mills, and tools, are made in large quantities for the cotton and sugar states. From the same section comes a steady demand for waggons; consequently Louisville has one of the largest factories in the world for farm and freight waggons. The largest textile industry west of Philadelphia is to be found in five great mills in Louisville, making the famous Kentucky jeans. This fabric, being durable, cheap, and of medium weight, is adapted for labourers' clothes, and finds a ready sale over twenty neighbouring states. In its train, too, has come the manufacture of jeans clothing, employing about 3000 women and girls.

Louisville still bears about it evidences of the fact that it is a border city in a border state. It has much of the energy and progress of the North, and much of the calm and conservatism of the South. Its growth has been slow and substantial, without any artificial methods of forcing. But to-day it is the leading manufacturing point south of the Ohio River, not even excepting New Orleans, with its larger population.

ELLEN C. SEMPLE.—*Journal of School Geography*, 1900.
By permission of Professor R. E. Dodge.

The Mississippi below St. Louis

Below the mouth of the Missouri the great river takes a wholly different appearance and character from those of the lovely stream which stretches from Lake Pepin down. The Missouri gives to the Father of Waters most of the characters which dominate it until it has been reinforced by the Ohio, the Arkansas, the White, and the Red. The river is for ever making land on one side and tearing it away on the other, the bends in its course not permitting the current to wash both banks with equal force. The farmer on the alluvial bottom sees his cornfield diminish year by year, acres slipping into the dark current.

At the junction of the Missouri properly begins the Lower Mississippi, though the name is not usually applied to the stream until it has crossed the grand rocky chain, or bed, extending across its channel between St. Louis and Cairo. All below this chain in the Mississippi valley is alluvium, through which the river wanders from one bluff to another, the bluffs being from 40 to 100 miles apart. Touching these bluffs at Commerce (Missouri), on the west bank, it courses across the valley, passing the vast prairies of Lower Illinois, known as Egypt, on the east, meets the Ohio at Cairo, then strikes the bluffs again at Columbus, on the eastern or Kentucky shore. It skirts these as far as Memphis, having on its west the broad earthquake lands of Missouri and Arkansas. It then crosses its valley to meet the White and Arkansas Rivers. Reinforced by these, it again crosses its valley to meet the Yazoo near Vicksburg, creating the immense Yazoo reservoir on the east bank, extending from the vicinity of Memphis to Vicksburg, and the valleys and swamps of the Macon and Tensas on the west side. From Vicksburg to Baton Rouge the river hugs the eastern bluffs, and from Baton Rouge to the mouth is pure delta country, for a distance of more than 200 miles.

All this valley, below the rocky chain crossing the river channel, lies lower than the high-water line of this powerful stream, and the efforts of men to stay an inundation seem very puerile. Some of these districts have been imperfectly levéed, others have never been protected at all. In an hour the planter is doomed to see a thousand acres, carefully prepared for planting cotton, covered with water two or three feet deep. The country now becomes a swamp; the roads are rivers, and the lakes are seas.

E. King.—*Southern States of North America.* Blackie.

By permission of Messrs. Blackie.

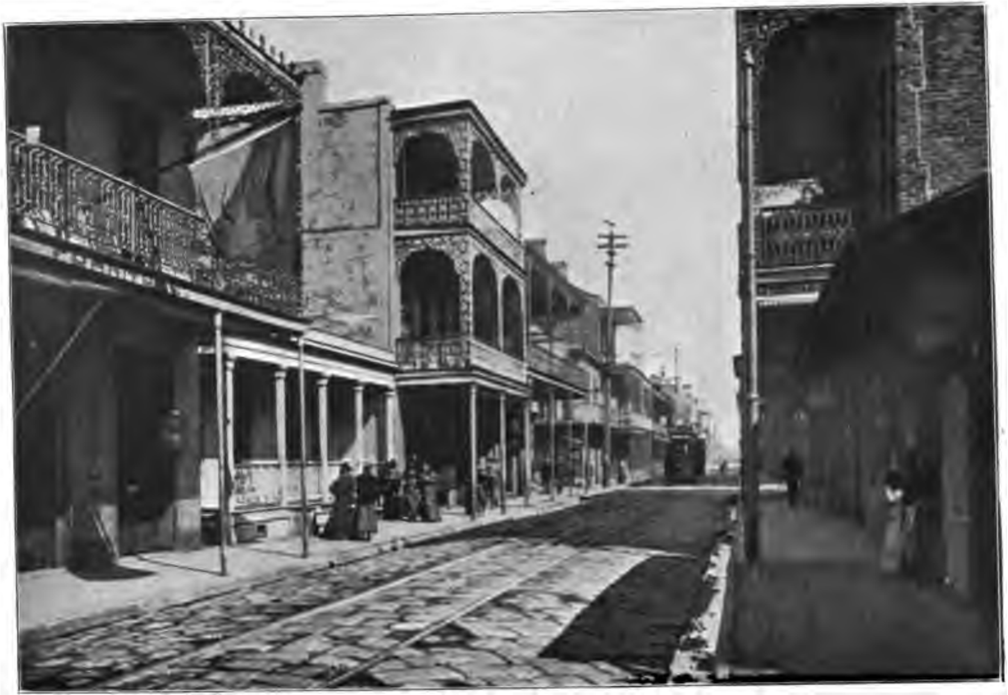
For a detailed description see *ibid.*, pp. 50-319. For the Ohio River, *ibid.*, p. 693.

See p. 67.

New Orleans

New Orleans is situated on the left bank of the Mississippi, 107 miles from its mouth, in that portion of the State of Louisiana which constitutes the river's larger delta. This peculiar region is an irregular expanse of densely-wooded swamps, wide prairies, and sea marshes, interlaced by innumerable lakes, streams, and bays. Through this region the Mississippi, as in its southward course it reaches 30° N., turns and runs tortuously eastward a few miles south of and parallel with a chain of these delta lakes, Lake Pontchartrain being the chief. At 90° W. it bends abruptly southward and again eastward, thus portioning off on the low concave land, which is always highest at the river's margin, a shallow basin, rudely square in shape, and not unlike the palm of one's hand. This deep three-sided bend, some nine miles in total length, is the harbour of New Orleans, and on the low tract, walled in by the dyke or levee that lines its bank, and by a similar defence where Lake Pontchartrain, some four to six miles to the northward, shuts in the fourth side, lies New Orleans, the principal seaport of the Mississippi valley. The river at this point varies from 1500 to 8000 feet in width, and it broad channel often stretches almost from shore to shore. Along the margins of this fine harbour a line of steamers and shipping extends for seven miles on either shore, moored, in the busy season, from two to five abreast.

New Orleans is emphatically a commercial city. It was its commercial value as the southern gateway of the immense valley behind it, and as the key to the free navigation of that vast natural system of waterways of which the Mississippi is the great main artery, that in 1803 led to its purchase by the United States, and the purchase with it of the entire province of Louisiana. Along its winding harbour-front one sees, in the season that follows the harvests of the south and west, the energies and activities of an exporting movement not excelled in volume or value save by New York. The levee, the wharves, and the contiguous streets are gorged with the raw staples of the countries far and near that lie about the Mississippi and its tributaries—sugar, molasses, rice tobacco, Indian corn, pork, staves, whisky, wheat, oats, flour in immense quantities, and over and above all else, nearly one-fourth of the world's entire supply of cotton.



From Copyright Negative of Detroit Photographic Co.

NEW ORLEANS—ROYAL STREET.

All other movement is insignificant: the import trade is small, manufactures are inconsiderable. On any hand, it requires but a step or two aside from the current of commercial movement to carry one into the bowery repose of a huge suburb, rather than of a city, or, if of a city, a city of villas and cottages, of umbrageous gardens, intersected by 470 miles of unpaved streets, shaded by forest trees, haunted by song-birds, fragrant with a wealth of flowers that never fails a day in the year, and abundant in season with fruit—the fig, the plum, the pomegranate, the orange. No other large city in America is so laid open to the sunshine and the air.

G. W. CABLE.—*Encyclopædia Britannica.* A. and C. Black.

By permission of Messrs. A. and C. Black.

See also KING, *Southern States of North America*, pp. 50-66.

Cattle on the Prairies of Nebraska

From Omaha to Cheyenne[1] the railroad passes nearly the whole way through the State of Nebraska. As a rule nothing is seen from the train windows but endless plains, stretching out as far as the eye can reach on both sides, and covered with a sparse vegetation of buffalo or prairie grass. But, although the herbage appears so poor and thin, it is extraordinarily nutritious. On it, in years gone by, countless numbers of buffalo existed; nowadays countless herds of well-bred cattle not only exist, but fatten. Nor are these hundreds of square miles of prairie mere summer runs, for almost the whole carry cattle all the year round. It would seem that the grass, instead of rotting if left uncut, as with us, becomes self-made hay, and as such affords excellent winter provender for the cattle. I can only account for this by supposing that it is due to the intense dryness of the atmosphere. The head of cattle possessed by individuals is enormous; sometimes over 16,000 bear the brand of the same stock-owner. As may be supposed, this cattle-trade is a great source of traffic to the railway company. Nearly the whole are transported to Chicago, whence they are sent to New York and other great eastern cities. These vast, monotonous, bare-looking prairies are already the great beef-producing regions of the United States.

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[1] Pronounced Shienne.

When the mountain ranges are reached, the plains which support these masses of cattle all the year round almost disappear. There are some tracts and "parks" enclosed between the mountains, where the summer food is most luxuriant, but where it would be impossible to leave the cattle during the winter on account of the depth of snow which lies on them for many months. Snow falls heavily on the prairies too, but the wind[1] sweeps over the low ridges and keeps the sweet herbage from being covered up, so that the stock is enabled to pick up a fair supply of food.

Great fortunes are made by the stock-owners, where experience is combined with industry and steadiness; but the life of the "cow-puncher" is one full of hardship and excitement. Amongst themselves they have to guard against cattle-stealing and false claiming and branding, which latter is especially practised on the calves in early spring.

When moving stock for sale or any other purposes, the stockman has often to spend both day and night in the saddle, not daring to leave his charge, which are in the habit of attempting to break away back to their old pastures. From being so much on horseback, he becomes a most hardy and skilful horseman. One man I met had ridden on an average 60 miles a day for thirteen consecutive days.

A. P. VIVIAN.—*Wanderings in the Western Land.* Sampson Low.
By permission of Messrs. Sampson Low.

The Platte

Without excepting even the Missouri, the Platte is doubtless the most important western affluent of the Mississippi. Its valley offers a route scarcely to be surpassed for natural gradients, and by following up its tributary—the Sweetwater—the engineer finds a line laid down by nature to the foot of the South Pass of the Rocky Mountains, the dividing ridge between the Atlantic and Pacific water-beds. The Canadian voyageurs first named it La Platte, the Flat River, discarding the musical and picturesque aboriginal term "Nebraska," the "shallow stream," a name which happily has been retained for the state. Springing from the eastern slope of the Rocky Mountains, it has, like all the valley streams westward of the Mississippi, a declination to the south-east. From its mouth to the junction of its northern and southern forks the river valley is mostly level, and the scenery is of remarkable sameness. There is not a tributary, not a ravine, in places not a tree, to distract attention from the grassy intermediate bottom, which extends from 4 to 5 and even 12 miles in width, bounded on both sides by low, rolling, sandy hills, thinly vegetated, and in few places showing dwarf bluffs. Between the Forks and Fort Laramie the ground is more accented; the land near its banks often becomes precipitous.

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[1] Chinook or Fœhn wind, see pp. 6, 38.

The stream averages about a mile in width, and sometimes widens out into the semblance of an estuary. In places it is a labyrinth of inlets, variously shaped and of all sizes. The shallowness of the bed causes the water to be warm in summer—a great contrast to the clear cool springs on its banks. The water, like that of the Missouri, and for the same reason, is surcharged with mud drained from the prairies. The site being nearly level, the river easily swells, and the banks are, though vertical, rarely more than 2 feet high. The inundation raises it to about 6 feet throughout: this freshet, however, is of short duration.

SIR R. BURTON.—*City of the Saints*. Longmans.

By permission of W. H. Wilkins, Esq.

The Bad Lands

The Mauvaises Terres, or Bad Lands, is the expressive name of the strangest, and, in many respects, most repulsive scenery in the world. They are tracts of irreclaimable barrenness, blasted and left for ever lifeless and hideous. To understand their peculiar features it is needful to bear in mind that they lie on the sites of old lakes, and that they have been carved out of flat sheets of sandstone, clay, marl, or limestone, that accumulated on the floors of these lakes. Everywhere, therefore, horizontal lines of stratification meet the eye, giving alternate stripes of buff, yellow, white, or red, with here and there a strange, verdigris-like green. These strata extend nearly horizontally for hundreds of square miles. They have been most unequally eroded. Here and there flat-topped eminences or "buttes," as they are styled in the west, rise from the plain in front of a line of bluff or cliff to a height of several hundred feet. A butte is only a remnant of the original deep mass of horizontal strata that once stretched far across the plain. Its sides and the fronts of the terraced cliffs, utterly verdureless and bare, have been scarped into recesses and projecting buttresses. These have been further cut down into a labyrinth of peaks and columns, clefts and ravines, now strangely monumental, now uncouthly irregular, till the eye grows weary with the endless variety and novelty of the forms.

There is a further feature adding to the repulsiveness of the Bad Lands. There are no springs or streams. Into the soil, parched by the fierce heats of a torrid summer, the moisture of the subsoil ascends by capillary attraction, carrying with it the saline solutions it has extracted from the rocks. At the surface it is at once evaporated, leaving behind a white crust or efflorescence, which covers the bare ground and encrusts the pebbles strewn thereon. Vegetation wholly fails, save here and there a bunch of salt-weed, or a bunch of the ubiquitous sage-brush, the parched, livid green of which serves only to increase the desolation of the desert.

Sir A. Geikie. —*Macmillan's Magazine*, July 1881. Quoted Baillie Grohmann.—*Camps in Rockies.* Black.

By permission of Sir A. Geikie and Messrs. Macmillan.

Texas

Texas is by far the largest state in the Union. Some idea of the vastness of this one state may be gathered when it is learned that Texas is 34,000 square miles larger than the Austrian Empire, 62,000 than the German Empire, and nearly 70,000 greater than France.

The country lying east of 96° long. and north of 30° N. lat., known as East Texas, is characterised by a long range of hills running irregularly from north-east to south-west, and by a heavy growth of timber, chiefly pine, oak, and hickory. The territory east of the timber region is a vast open plain, composed of gently rolling prairies and gradual elevations. It is covered with a luxuriant growth of native grasses, and occasionally dotted with timber, and extends to the Red River on the north and the mountain ranges of the west and north-west. The water-courses and ravines are usually fringed with a growth of timber. West and north-west lie the hills and mountain regions of Texas, which are continuations of the mountains of Mexico, New Mexico, and Colorado.

In the extreme north-west, bordering on Kansas on the south, and New Mexico on the west, is the elevated table-land formerly known as the Llano Estacado, or Staked Plain. It is to-day called the Panhandle, and is destined to become one of the best agricultural and stock-raising sections of the state.

The climate of Texas is variable, with short winters and long dry summers. The prevailing wind is the south wind from the Gulf of Mexico. The "norther" is an important feature of Texan climate. It is a cold wind from the

SIGNAL BUTTE, TEXAS.

north. The long unobstructed sweep across the prairies from the plains of the north-west heightens its velocity and renders its approach more sudden. The wet "norther" does more damage to crops and live stock than the dry; its duration is generally about twenty-four hours. Dry "northers" last from forty-eight hours to a week, the wind attaining its greatest velocity within twenty-four hours, and then gradually subsiding and veering to the south again.

Cotton is the leading crop, and is grown generally through the agricultural portions of the State. As a rule one-fourth and sometimes a greater proportion of the cotton raised in the United States is produced in Texas.

British Consular Reports, 1894.

VII. THE CORDILLERAS OF BRITISH NORTH AMERICA AND THE UNITED STATES

The Alaskan Cordilleras

THE vast cordilleran system which follows the west coast of both South and North America traverses southern Alaska, and, bending westward, follows the coast to the end of the Alaskan peninsula.

The partially submerged continuation of the same system forms the Aleutian Islands, more than 1000 miles in length. The culminating points of this great system in North America are two rival peaks, Mount Logan, 19,500 feet high, and Mount St. Elias, 18,010 feet high. A host of neighbouring peaks, several of which exceed 14,000 feet in elevation, make this region one of the most rugged and impassable in the world. For fully 300 miles from Cross Sound westwards the mountains rise precipitously from the sea to great heights, and above an elevation of about 2500 feet are always snow-covered. In vast *névé* fields, filling the valleys and depressions among the higher peaks, thousands of glaciers have their birth, and flow both north and south. Among those on the southern slopes of the mountains there are hundreds which practically reach sea-level, and scores that discharge into the waters of the Pacific.

North of Mount St. Elias there is an extremely rugged country where man has never penetrated. This region bristles with lofty peaks overlooking ice-filled valleys, from which many magnificent glaciers flow. A lofty peak in about 63° 30′ N. lat. and 147° W. long., has been seen from a distance by a few trappers and traders, and is thought to rival even Mount St. Elias in height and magnificence. Problems of great geographical and geological interest there await the explorer, and in no other portion of North America can one expect to obtain a greater return for hardship and exposure than in this wild ice-bound land.

PROF. I. C. RUSSELL.—*Scottish Geographical Magazine*, August 1894.

By permission of the Royal Geographical Society.

Mount St. Elias

Without a doubt the scenery at Yakutat is the most wonderful of its kind in the whole world. The mountains are covered with snow and glaciers from sea-level to summit. The air of early morning in latitude 60 N. is exceedingly transparent, while the vastness of these mountains, ranging as they do from 16,000 to 20,000 feet, impresses the beholder under these conditions with the sensation of their being too ethereal to have any actual existence.

St. Elias—the last and highest mountain of the range, and the nearest to the sea—stands on a broad base, from which it rises like an Egyptian pyramid, straight, regular, and massive, from an icy plateau of enormously extensive glaciers.

The first features that fix the attention are the outline as seen from Icy Bay, being a reproduction on a slightly larger scale of Mount Fairweather; next that Elias forms a regular quadrilateral pyramid; next the detached circular crater-like basin nearly half-way up the central front; next the regularity of three of the pyramidal side ridges and the assumption that the fourth ridge must be equally regular; and fifthly, the solitary and isolated situation of the Ice King—the terminating and crowning elevation of his range, so close upon the sea—the highest peak in North America gazing out over the largest ocean in the world. But though so like in shape to Fairweather, which is 15,500 feet, there exists a difference, in that the two ridges, which appear like shoulders or wings on each side of the two summits, in Elias are longer, while the eastern shoulder is lower than the western. In Fairweather both are of equal height. The four aretes or ridges appear to run north, south, east, and west. The north-west face of the mountain has never been seen. The north-east face seemed from Yakutat to consist of steep cliffs. The east ridge descends from the summit as a snow arete with a gradually decreasing rapidity for about 4000 feet, forming one of the before-mentioned shoulders, from which point it falls in cliffs of steep black rock with one break, a depression holding a small hanging glacier.

Next comes the south-east face. The upper triangular part consists of steep slopes of rock and snow, and the lower part of perpendicular precipices.

The sharp contrast between the black and the white, the rock and the snow, and the well-defined line of demarcation, half-way up, between snow-field and precipice, form a marked feature of this face.

Then the central or south ridge of the pyramid slopes at an angle of 45° from the summit to a depression lying 7000 or 8000 feet below it, between the mountain and the crater-basin.

This crater, for such it appears, though we find no volcanic traces on the moraine, should be from 4000 to 5000 feet in diameter. It lies in front of, and separate from, the main volume of the mountain, and about midway between base and summit.

The encircling ridge encloses it on three sides only, leaving the interior open to view on the south-east. The inner cliffs of the crater descend too steeply to allow snow to rest on them, but enclose four hanging glaciers. On the outside of the crater are five other glaciers, and between them four ridges descending to the main glacier at the foot, which seem accessible half-way up—two of them look very easy—whence the rim of the crater could be reached.

From this point it appears that the main snow-fields on the south-west might be attained.

On the south-west side, from the summit of Elias, the snow and rock, very steep at first, stretches down at a gradually lessening angle to a plateau of *névé*, which winds down towards the crater, then turns from behind it to the westward, being much crevassed, and descends at an angle of about 20°, which we named the Great Tyndall Glacier, which now flows to the south-east along the foot of the mountain, past the base of the crater, where it widens and turns to the south. At this point, where *névé* and glacier mingle, and which may be called the source of the main southern Elias Glacier, some tributary glaciers flow in and join from the westward; while between this point and the crater are two fine ice-falls. In the centre of the south-west face a long regular and sharp ridge joins the main mass of Elias, and divides the above-mentioned sloping plateau of *névé* into two.

This sharp ridge has also the effect of partly hiding the western edge of the Elias pyramid, which, as I could see from the highest point reached, trended somewhat to the northward in its lower part, and promised, on the whole, a not impracticable way of ascent. Reaching the west shoulder would be identical with reaching the summit itself.

H. W. SETON KARR.—*The Shores and Alps of Alaska.* Sampson Low.

By permission of Messrs. Sampson Low.

The Canadian Cordillera

After entering the mountains from the flat plains of Assinoboia the railroad is almost constantly hemmed in by high peaks, or lost in the depths of gloomy cañons throughout a distance of 400 miles, till the Pacific coast is reached. Even there, at the western border of the continent, the mountains appear to rise from the sea, while the land-locked bays and narrow fiords seem like flooded valleys in a sinking land. In this journey from plains to sea, the entire system of the Rocky Mountains is crossed, and the observing traveller will notice that there are in all four pretty well-defined ranges. Of these the Coast range and the Gold range are nearest the sea, and are characterised by mountains of low or moderate elevation, generally covered by coniferous forests nearly or quite to their summits. The streams and large rivers have cut deep channels through the rocky strata, and have made gloomy cañons in the process. It was in these two ranges of British Columbia that the greatest engineering difficulties were encountered when the railroad was building.

.The third range from the coast is the Selkirk range, justly celebrated among mountaineers as the "Switzerland of America." In this range the highest peaks attain an altitude of about 11,000 feet. The rocks are schists and quartzites of the oldest geological formations, and have been carved out into domes and pyramids of striking forms and appearance. The valleys are clothed in a dark green covering, a dense coniferous forest of cedar, hemlock, spruce, and pine. The humidity of the climate, caused by the damp air-currents from the Pacific passing over the lofty mountains, is the reason why these forests are so dense and luxuriant. In fact, the undergrowth of ferns, alder bushes, and the prickly Devil's Club, combined with the moss-covered tree trunks here and there lying prostrate in the forest, offer an almost impassable jungle to the explorer travelling with pack-horses. The very great precipitation in winter accumulates in snow-fields of considerable area on the higher parts of the mountains, and from these reservoirs glaciers descend into the valleys to an altitude of 5000 feet above the sea-level. The contrast in colour and form between the dark green forests of the valleys, the pure snow and blue ice of the glaciers, and the brown or iron-gray cliffs of the higher peaks, gives an ensemble of mountain beauty and grandeur comparable to that of the Alps or Caucasus.

The fourth and last range is nearly 400 miles from the

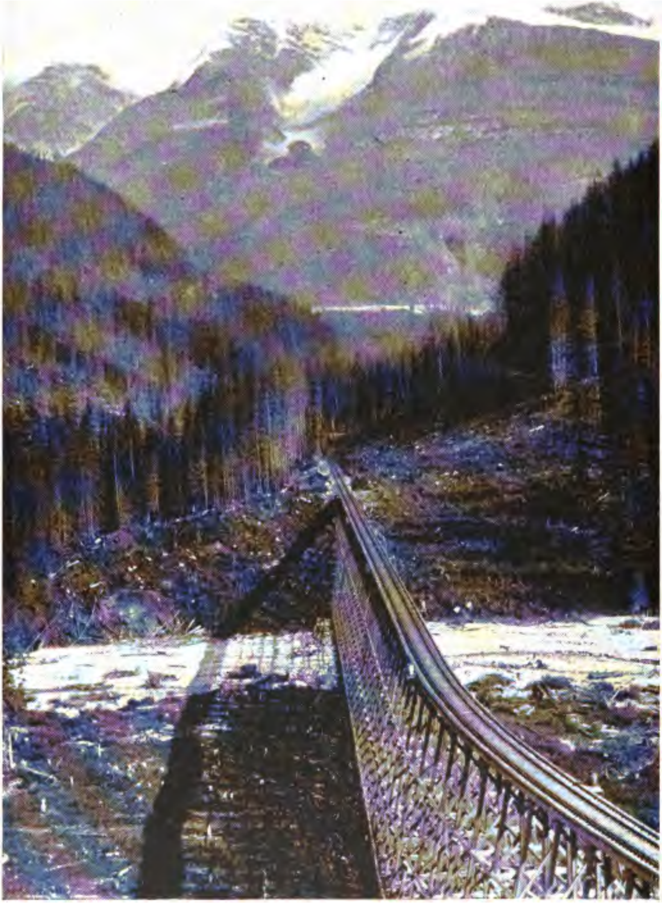
Pacific coast. Its mountains rise in sheer cliffs and escarpments direct from the plains, and tower up in sullen walls of rock from 3000 to 5000 feet above their bases. This range of the Rocky Mountains proper is frequently called the Summit range. The highest crest forms the divide or watershed between the rivers that flow into the Atlantic, and those that drain into the Pacific, and is also the boundary between the Canadian provinces of British Columbia and Alberta. These mountains are in many respects quite different from the Selkirks and other ranges to the west. The mountains are higher and more rugged, reaching altitudes of nearly 12,000 feet; the snow-fields and glaciers are even more extensive than those of the Selkirks, while the forests are far less dense and the trees smaller in size. The rocks are sandstones, shales, and limestones, disposed in very clearly marked layers, sometimes horizontal, but frequently tilted up at all angles and contorted in complex folds. Wherever the mountains are made of horizontal strata, the weathering has produced curious natural monuments and sharp pinnacles of strange and fantastic forms, while very often an entire mountain resembles some ancient castle with towers and battlements imitating in appearance the works of man with striking fidelity. Standing on a high elevation in this range, the mountains appear as long ridges of rock with very few isolated peaks, so that the general impression given by the successive ridges and valleys as one looks over a vast extent of country to a distance of perhaps 100 miles, is that of a stormy sea in which the mountains represent colossal billows.

W. F. Wilcox.—*Journal of School Geography*, 1897.

By permission of Professor R. E. Dodge.

The Giants of the Canadian Rockies

Two days later, on August 17, we camped on the pass that leads across from the head-waters of the Sas-



ROCKY MOUNTAINS.

katchewan to the Athabasca, at a height of about 7000 feet, on an old Indian camping-ground.

We started to climb a fine rock and snow-peak opposite our camp towards the south-west. With considerable trouble, and after a fine climb, we finally got to the top at 5.30 p.m. A magnificent view lay before us in the evening light. To the south at our feet lay the great glacier that feeds the North Fork of the Saskatchewan, and we could see an easy way up its true right bank to nearly where it joined a great snow-field. At this point, instead of being hemmed in by the side of a valley, lay a flat and marshy piece of land rather below the level of the glacier ; the other end of this piece of land drained down to the Columbia River on the west—evidently it was an easy pass, but difficult or impossible for horses, for some distance would have to be traversed over the glacier. Farther away to the south, a high peak lay between this glacier and the west branch of the North Fork, flat-topped and covered with snow ; on its eastern face a precipitous wall of rock. Mount Lyell and Mount Forbes could be seen far off in the haze. But it was towards the west and north that the chief interest lay. We were looking on country probably never before seen by human eye. A vast snow-field, feeding many glaciers, lay at our feet, rock-peaks and snow-covered mountains were ranged around it, whilst far away to the westward we could just see through the haze the valley of the Columbia River. This great snow-field, from which the Saskatchewan glacier takes its rise, also supplies the ice for another glacier at the head-waters of the Athabasca ; whilst to the west we saw the level snows bending over to flow down more than one channel, feeding, when melted, the rivers that empty themselves into the Pacific Ocean.

A magnificent peak, that is probably near to 14,000 feet high, stood alone keeping guard over these unknown western valleys. We have ventured to name it after the Right Hon. James Bryce, president of the Alpine Club.

Some few miles to the north of this peak, and also on the opposite side of the snow-field, in a north-westerly direction, the biggest peak of all was seen. Chisel-shaped at the head, covered with glaciers and ice, it also stood alone.

The glacier that fed the waters of the Athabasca River we have called the Athabasca glacier. Two days later we all three camped with sleeping-bags, as far up its right bank as possible, and in the dark at three o'clock next morning started up the glacier by lantern-light. This glacier descends from the snow-fields above in three successive icefalls, the last one very much crevassed. It was not till past seven o'clock that we finally emerged on to the snow-fields above. The day was warm and sultry, making us all feel tired. For several hours we walked across the snow towards the chisel-shaped peak; to the westward Mount Bryce sent its three peaks high above us into the air. A double-headed peak on the north hid the high rock peak we thought might be Brown (afterwards named Mount Alberta), when we were on the top of the Athabasca peak. But the peak we were walking towards was farther off than we thought, and as it seemed very unlikely that we should get to the top of it that day, we turned, after having looked down into a vast amphitheatre that lay between the chisel-shaped peak (afterwards named Mount Columbia) and the double-headed peak, or the Twins. This amphitheatre is the source of another branch of the Athabasca. To the south-east of where we were, and almost on our way home, rose a great dome of snow. After a hot and very tiring climb through soft snow that broke under our feet at every step, we finally got to the summit at 3.15 p.m. (11,650 feet). Although we did not know it at the time, we were standing on probably the only peak in North America the snows of which, when melted, find their way into the Pacific, the Arctic, and the Atlantic Oceans; for its glaciers feed the Columbia, the Athabasca, and the Sashatckewan Rivers.

PROF. N. COLLIE.—*Geographical Journal*, April 1899.

Mount Brown and Mount Hooker

Retracing our steps, we ferried once more across the Athabasca, and followed the impetuous, sea-green whirlpool river to its source. Once a much-travelled thoroughfare of the Hudson Bay Company and railway explorers, the Athabasca Pass has now fallen into disuse. Portions of the trail have been swept away by the river, and many other parts we found impassable without hard chopping.

The valley is interesting. At one point a glacier comparable to that of the Rhone sends its blue ice-front almost to the level of the river at 4400 feet, and supplies a third of its water. Other large glaciers provide the rest of the flood farther up the valley, until at the watershed the Whirlpool dwindles into an insignificant rivulet rising in a pretty little tarn, the Committee's Punchbowl, which masquerades on many maps as a lake 8 or 10 miles long. A rill trickles southward from the other end of the "bowl," which thus divides its snow-fed waters between the Arctic and Pacific Oceans at points thousands of miles apart.

Mount Brown greatly disappointed us. The only summit corresponding to its position on the maps, just west or north-west of the Punchbowl, turned out to be little, if any, more than 9000 feet high. We found no difficulty in the ascent, except a mile of steep snow-field, until just beneath the summit, where a cornice of snow proved unscalable. Readings of an aneroid, and of a boiling-point thermometer, when compared with readings at camp, give a height of 3340 feet above the pass, or 8950 feet above the sea; and they estimate the thickness of the snow cornice covering the crest at less than 100 feet. From the top no higher mountains were to be seen west of the pass, so that there is no doubt the right mountain was climbed. Mount Brown must descend, then, from the position long accorded to it, of being the highest summit in North America between Mexico and Alaska. It has no right to be mentioned in connection with Mount St. Elias in Alaska, nor Orizaba in Mexico, much less with the recently discovered Mount Logan, just east of the Alaskan frontier in the Canadian North-West Territory.

The case of Mount Hooker we found less easy to settle. The point nearest its position, as given on the map, is only about 8000 feet high, according to aneroid readings taken by Mr. Stewart and my brother; but a handsome glacier-covered mountain, just east of the Punchbowl, probably reaches 11,000 feet, and there are summits a few miles to the south-east that may reach 12,000 or 13,000 feet, though lack of time prevented their ascent.

The Punchbowl, reflecting gloomy mountain flanks and snow-fields, suggested no ideas of conviviality. The little meadow beside it, surrounded by stunted spruce groves, was enlivened with some flowers. Marmots sounded their alarm whistle from behind every rock when any sound, like the chopping of wood, disturbed them. A cinnamon bear walked calmly down into the patch of meadow, surveyed us a moment, and turned courteously into the woods, so as not to disturb our privacy. Caribou left their large hoof-prints on the river flats not far away, and mountain sheep and goats doubtless watched us from afar; but the general effect of the surroundings was lifeless and austere.

PROF. A. P. COLEMAN.—*Geographical Journal*, Jan. 1895.
By permission of the Royal Geographical Society.

Flora and Fauna of the Canadian Rockies

The almost universal forest tree from the Bow River up to the tree-line is Englemann's spruce. This tree forms a rich and luxuriant dark forest wherever the slopes are not too steep to support a thin soil. It averages 75 feet in height and about 15 inches in diameter. This tree is occasionally replaced in part by small areas of the black pine. The Lyall's larch can only contest on equal terms with the spruce at about 6800 feet above sea-level, and from there up to the tree-line, which is here about 7400 feet. It might be mentioned, in connection with the tree-line, that the snow-line, as determined by the limit of *névé* on the glaciers of this region, lies somewhat lower, approximately 7000 feet. One or two snow patches remained near the shores of Lake Louise (5643 feet) till August 1.

There are only a very few deciduous trees, which appear chiefly along the banks of the rivers or in open sphagnum swamps caused by slight morainal dams, and also in the clearings made on the mountain slopes by snow avalanches in winter. A few bushes, and especially the numerous herbaceous plants, make a most beautiful and brilliant floral display during July and August. Epilobiums and Castilleias line the barren, gravelly flood-courses of glacial streams, and make a bright but discordant array of magenta and scarlet flowers. A species of Myosotis grows very abundantly in the valleys. *Aquilegia canadensis*, which is scarlet in the eastern states, here grows yellow throughout. The forests are filled with multitudes of elegant flowering plants, of which none is more widespread or more attractive than the one-flowered Pyrola. As in all the alpine regions, the plants seem more brilliant in coloration as the snow-line is approached. Many dwarfed forms of plants, chiefly Compositæ, grow on peaks and slopes over 8700 feet above tide, while a species of anemone, though growing lower, often seems to push its eager stalk through the edges of retreating snow, and blossom within a few yards of snow that is almost perpetual. No adequate idea, however, of the number and variety of flowering plants in these mountains could be conveyed without the aid of a systematic list, which unfortunately is not at hand.

A great number of interesting animals were either seen or their tracks observed—the black bear, mountain lion, lynx, wolverine, porcupine, weasel, and marten, several species of rodents, squirrels, rabbits, marmots, and a number of small rat-like animals inhabiting the rocks in alpine regions. By far the most characteristic animal in the region is the Rocky Mountain goat. This animal corresponds in habits and shyness to the chamois of Switzerland. The coat is nearly snow-white, long, shaggy, and very thick. Both sexes are furnished with horns about 7 or 10 inches long, curving gently backwards, and very sharp. One goat was shot by a member of our party, after six weeks' constant hunting, which weighed about 200 lbs. They are said to attain a weight of 300 lbs. in some specimens. They are magnificent animals, inhabiting the loftier mountain slopes, and running with ease and indifference along precipitous ledges and places impossible to man. Endowed with wonderful faculties of scent, sight, and hearing, and being, beside, very timid by nature, they are most difficult to hunt, and will naturally preserve themselves for many years, as few hunters have the patience or fortitude to get near enough for a shot.

The forests are full of a great variety of birds, many of which sing the greater part of the summer. In the deeper woods are found a species of pheasant called the blue grouse, and along with these, and also more frequently in the "alps" and rocky slopes of rocky mountains, a species of grouse called by some ptarmigan, and by others the fool hen. Both these birds are good eating, and when fired at will usually remain quite unmoved until killed. Hence the name of the species.

W. D. Wilcox.—*Geographical Journal*, April 1896.

By permission of the Royal Geographical Society.

The Cascade Mountains

The Cascades are the continuation of the Alaska and British Columbia range, about 100 miles from the ocean, and are themselves continued southward through California by the Sierra Nevadas.

The Cascade Mountains were raised in the usual way by gradual upheaval from the ocean, reaching varying altitudes up to 8000 feet; but the great cones, rising from 1000 to 7000 feet higher, were built up around the discharging vents of volcanoes. There is a marked difference between the mountains that have been gradually elevated, and those that have been accumulated about volcanic craters, the former being more connected and rolling, and the latter standing out as single peaks, appearing to rest upon the other mountains, their sides having great lava ridges and basalt cliffs, and seamed with tremendous cañons down which glaciers grind their toilsome way.

The forests of the Cascades are very dense and the trees large. This is due to the mildness of the climate and the humidity of the atmosphere.

The rainfall is very heavy, and warm, moisture-laden winds from the ocean penetrate the mountains except during the summer months, promoting a luxuriant growth of vegetation. Fir trees reach an extreme height of 400 feet and a diameter of 15 feet, trees half these dimensions being very common. Cedar trees have been found as large as the firs, but fully a third shorter. These large trees grow on the lower levels, the size and character of the timber decreasing and changing as altitude is gained.

The forests crown the mountains to their summits, except the volcanic ones, on whose side the forest line terminates between the altitudes of 8000 and 9000 feet. Above this height the peaks are masses of snow, ice, lava, cliffs, glaciers, and glacial moraines. The last trees at the timber line are stunted in size and twisted by the storms that sweep around the peaks in winter. They are of several varieties of spruce, fir, pine, and juniper, the latter becoming finally but a creeper on the exposed moraines. The foliage, especially of the alpine spruce, is a brilliant green.

The craters of the volcanic cones are now filled with ice, covered with snow. The depth of this ice is unknown. In the crater of Hood there is a crevasse half a mile long, and 10 to 30 feet wide, formed by the breaking away of the ice on an extremely steep slope near the upper rim of the crater. All efforts to find the bottom of this crevasse, by the use of ropes and weights, or by rolling lava rocks into it, have failed. On the steep mountain slopes and on the glaciers there are other crevasses, wide and narrow, shallow and deep, regular and broken, all of them glistening with the inimitable glacier green, but none of them so great as this yawning chasm in the crater of Hood.

On each of the great volcanic peaks there are from one to half a dozen glaciers. These rivers of ice occupy huge cañons on the mountain sides, and move steadily down a few feet each year to the level, where they are affected by the summer heat, and, melting, become the fountain-heads of the rivers. These streams usually issue from caves in the ice at the lower face of the glacier, and the water is almost as white as milk. The streams thus formed are augmented by hundreds of rivulets from melting snow, and from springs on the slopes, from which the snow has disappeared, and soon become mountain rivers of considerable volume. The cañons down which the glaciers move are irregular, and the crowding of the ice through the narrow portions heaves the surface of the glacier into great irregularities. There are high ridges and hummocks and innumerable crevasses, rendering travel over them difficult and sufficiently dangerous to require great caution.

The animal life of the Cascades, as would be expected of a region of such luxuriant vegetation, is varied and abundant. Once elk and deer were numerous, but persistent hunting has sadly reduced their numbers. Grizzly, black, brown, and cinnamon bears, and cougars, or mountain lions, are still quite plentiful, though hunting has also reduced them. Squirrels, foxes, badgers, coons, and wolves are also numerous. Mountain quail, grouse, and partridges are the game birds, while a great many varieties of smaller birds are found. The forests abound in wild flowers of many kinds, and there is a dense growth of shrubs, many of them of flowering varieties, making the forest brilliant with colour in spring-time. The large-flowered dogwood is the most noticeable and the most abundant, though the red blossoms of the wild currant, the syringa blooms, and spiræa festoons, vie with them in beauty. Higher up the mountains the beautiful rhododendron is found in abundance, the queen of all the wild flowers of this region.

There is one noticeable feature of the Cascade Mountains, and that is the fact that but one route through them has been opened by nature, the route of the Columbia River. The gorge of the Columbia, through which the river has cut its way as the one great channel to the sea of the entire intermountainous region lying between the Cascades and Rockies, is bordered by great basaltic cliffs, in places 2000 feet high.

H. L. Wells.—*Journal of School Geography,* 1897.
By permission of Professor R. E. Dodge.

Peaks of the Cascades

An outstanding watch-tower of the Cascades on the east, and separated from the crest of the main range by a belt of 20 to 30 miles of rugged country, is afforded by Mount Stuart, 9470 feet above the sea. This lone summit, rising spire-like from a group of encircling foothills, commands a most magnificent and far-reaching prospect of the Cascade region. Standing on the summit of Mount Stuart, or better still on the apex of some one of its score or more of supporting peaks, having elevations of about 7500 feet, the eye ranges over a region containing many objects of magnificence. To the south-west rise the snowy domes of Mount Hood and Mount Adams. Apparently near at hand, especially on the wonderfully clear days following storms, although some 70 miles distant, stands Mount Rainier (often called Tacoma), beloved of all the friends of nature who have ever seen its glorious summit. Below the gleaming snow-fields, sheathing all the high portions of this the finest single mountain in the United States, south of Alaska, there are several ice-streams which descend far into the encircling forests.

What especially attracts the eye of the geographer who stands on the summit of one of the rugged foothills of Mount Stuart, particularly when the sun is rising above the distant cloud-like mountains of Idaho, or when only the summit of Rainier is aflame with the rosy light of the afterglow, is the generally even sky-line of the Cascades. On looking westward, one beholds what seems a vast plateau, rising gradually from far to the east of his station, like a great smooth surface swell of the sea, and attaining its maximum height along the sky-line to the west, about 7000 feet above tide. The plateau referred to, or, what is more nearly the case, the great elongated flat-topped dome, appears to have a smooth surface, because the valleys are in shadow, or filled with purple haze, and their presence lost to view. Mount Rainier stands on the Cascade plateau, and similar to it in position are Mount Hood in Oregon, Mount Adams, Mount Baker, and Glacier Peak in Washington. Each of these commanding summits, once aglow with volcanic heat, is now glacier-crowned. From each peak long tongues of ice, forming typical alpine glaciers, descend in all directions, and in several instances invade the dark coniferous forests with which the lower slopes of the mountains are clothed.

PROF. I. C. RUSSELL.—*Geographical Journal*, Dec. 1898.
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Oregon Crater Lake

Crater Lake, Oregon, is deeply set in the summit of the Cascade range, about 65 miles north of the California line. Approaching the lake from every side, the observer at a distance sees a broad cluster of gentle peaks rising about 1000 feet above the general crest of the range. These form a rugged rim encircling the lake. On arriving at the summit of the rim, a scene of majestic beauty comes suddenly in view. The deep blue lake is completely enclosed by 20 miles of almost continuous cliffs, ranging from 500 to nearly 2000 feet in height. On account of the precipitous slopes, it is a matter of considerable difficulty to reach the lake at any point. There is no platform along the shore to walk upon; the steep slopes continue beneath the water to great depths.

The lake is nearly circular in outline, with a diameter of about 5 miles, and its remarkably blue water has the great depth of 2000 feet. Its drainage area is but little larger than the lake itself. Only rain and small rills from springs and snow-banks clinging to the precipitous slopes feed the lake. It has no visible outlet, but, as precipitation is greater than evaporation in that region, the water must escape by percolation, else the lake would overflow.

The scenic features of the lake are remarkable and interesting, but far more so are those of the pit and the story of its origin, to be read in the composition and structure of the rim. The pit, which is half filled by the lake, is 6 miles across at the top and 4000 feet deep. From the top of the rim, which is the summit of the Cascade range, it reached down half-way to the sea-level, and nearly a square mile of bottom is below the level of Upper Klamath Lake, at the eastern foot of the range. The rim is composed wholly of streams of lava and volcanic conglomerate arranged in sheets. They are exposed in section upon the inner slope of the rim, and upon all sides dip away from the lake. It is evident that the rim is merely the hollow remnant of a large volcano, like Shasta or Rainier, that once stood upon the site of the lake.

J. S. Diller.—*Journal of School Geography*, 1897.

By permission of Professor R. E. Dodge.

The Sage Plains of Oregon

The vegetation of the great plains in Oregon between the Bitter Root and Cascade Mountains, consists primarily of sage brush, a shrub, 3 to 6 feet high, closely related to the wormwood of Europe, and having, in common with that plant, a light gray colour and strongly aromatic odour. Away from stream-beds and sinks and the shores of lakes, sage bush covers the whole country like a gray mantle, and constitutes probably nine-tenths of the total vegetation. It is a plant the herbage of which is eaten by but few animals, and by those only in starvation times,—one that will grow with little moisture and will stand the widest range of temperature. Sage brush gives to the country its character. A level stretch is known as a sage plain; the grouse which live there are known as sage hens; the fuel of the region is sage brush; the odour upon the atmosphere is that of sage brush.

National Geographic Magazine, Dec. 1896.

By permission of the National Geographic Society.

Portland, Oregon

Portland, Tacoma, and Seattle are the three most picturesquely situated cities in the United States, and of these three I would assign the palm to Portland. For although Mount Hood does not seem quite so near or imposing at Portland as Mount Tacoma does as seen from Seattle or Tacoma, the Portlanders have views from their streets, not only of Hood, but also of St. Helens, while the summits of Tacoma, Adams, and Jefferson are seen from the hills which encircle the city.

Of Mount Hood in particular the Portlanders have a magnificent view. Though it is about 50 miles away, there is not a hill to impede the view; and as the particular Cascade range with which Mount Hood is connected is of insignificant height, the peak stands revealed from head to foot in solitary grandeur, with snow reaching down two-thirds of the way even in August. It is a peculiarity of all the Oregon and Washington peaks that they thus rise abruptly from the ground, without any clustering neighbours. And this isolation, combined with the lowness of the snow-line, adds much to their grandeur and apparent height.

Portland owes its growth and its commercial importance to the fact that the Willamette River is navigable up to its wharves by the largest ocean steamers, so that the rich farm products of the Willamette valley can at once be shipped to all parts of the world without a long and expensive railway transportation. It is the outlet for one of the richest grain and fruit states of the Union.

Oregon has about 15,000,000 acres of timber land, with a soil that is excellent for grain or fruit, provided the timber can be removed. The cost of clearing an acre varies from $25 to $100.

H. T. FINCK.—*Pacific Coast Scenic Tour.* Sampson Low.
By permission of Messrs. Sampson Low.

Salmon Canning in Oregon

During the legal salmon season, from April 1 to July 31—which is also the tourist season in Oregon, since in July begin those forest fires which shroud the whole state, with its fine mountain scenery, in a dense cloud of smoke, lasting till September—the river steamers are liable to be stopped at any moment in mid-stream by boats loaded to the edge with salmon, which are to be conveyed to one of the numerous canneries that line the last thirty miles of the stream. Those canneries are buildings of the flimsiest construction, inhabited chiefly by Chinamen. The salmon are thrown on the wharf, where they are seized by the Chinamen, who carry them in, throw them on long tables, chop off the heads, disembowel and clean them, and cut them up into small lumps for the cans, all in about as much time as it takes to write this sentence. In the larger canneries everything, from the making of the cans to putting on the labels, is done on the premises. Some of the canneries are built on the shore; but as the river, where the ocean comes in sight, widens out into a bay seven miles wide, the canneries are built in midstream, on piles, and it is an odd sight to behold horses dragging in the nets on these flimsy mid-river structures. The river view is disfigured on all sides by the ugly stakes driven in to hold the nets that constitute the salmon traps. Several millions of dollars are invested in the boats, nets, and canneries of the Columbia River; but the recklessness of the fishermen threatens to kill the goose that lays the golden eggs. The Columbia River fisheries, which a few years ago were the largest in the world, have of late yielded less and less each year, and in 1889 they sank to third rank, Alaska being at the head and British Columbia second.

H. T. FINCK.—*Pacific Coast Scenic Tour.* Sampson Low.
By permission of Messrs. Sampson Low.

On a Summit of the Great Divide of the United States

From the top an immensely vast landscape is to be seen. Towards the north-west I descry the steam from the nearest Yellowstone geyser, 80 or 90 miles off, rising over a lower range of mountains. Immediately in front of me, trending east, lies a vast sea of broken country, savagely hacked and torn by a maze of huge fissures and gloomy cañon-like valleys, from which rise an infinity of strangely formed peaks and pinnacles. It is the weird Sierra Soshone. There is little timber about it, save on the lower slopes, increasing the forbidding look of this upheaved sea.

The three great rivers whose head-waters take their rise on the slopes of the mountain I am on are destined to be the three greatest rivers of the west, the smallest of which has a course of over 2000 miles and drains 300,000 square miles of country. One—the Big Wind River, the chief confluent of the Upper Missouri—flows into the Atlantic; the Grosventre (Belly River), one of the head-waters of the Snake, joins its waters with those of the Columbia, increasing the volume of the Northern Pacific Ocean; while the Green River of Colorado sends its waters into the Gulf of California. Such is the maze of creeks, silvery little streaks, peeping forth from the green sea of forest, that it is quite impossible to tell the ultimate goal of any one in particular, without following its course for many miles.

There are spots on the Divide where the sources of two creeks, one flowing to the Atlantic, the other to the Pacific, are within rifle-shot of each other; and on several occasions the morning's coffee was made from Atlantic and Pacific water, not more than 200 yards separating the springs.

W. Baillie Grohmann.—*Camps in the Rockies.* Black.
By permission of Messrs. A. and C. Black.

The Yellowstone Park

The Yellowstone Park lies in the midst of the Rocky Mountains, in the north-west corner of the State of Wyoming, and is bounded on the north by the territory of Montana, and on the west partly by Montana and partly by the territory of Idaho.

This great reservation, which forms approximately a square about 75 miles in diameter, is not intended only for the benefit and enjoyment of holiday-makers, scientists, and tourists. Situated as it is on the "Great Divide," its pine-clad mountains form the gathering ground for the head-waters of large rivers flowing away to the Atlantic and Pacific Oceans, and its sequestered dells and forest recesses afford a secure retreat to the surviving wild animals of the country. The American Government has wisely recognised the necessity of preserving the forests for the sake of the rainfall and the rivers, and the Park plateau, situated as it is some 7000 feet above sea-level, is exceptionally suited to collect the watery clouds which, coming from the south-west, precipitate vast quantities of snow and rain on the cooled table-land and the mountains which surround it. The climate of the Park is cooler and moister than that of the surrounding country.

Rain-storms are common in summer, and snow may fall at any time between September and May. The deep snows of winter are preserved by the forests throughout a great part of summer, and in some of the higher altitudes the drifts never completely disappear.

To the south of the Park the magnificent mountain masses of the Tetons, fully 14,000 feet in height, stand out prominently against the sky—the highest and grandest peaks of the northern Rocky Mountains.[1]

Further east, across the broad valley of the Upper Snake River, lies the Wind River range, famous from the earliest days of the Rocky Mountain trappers. The Absaroka range, which cannot be topographically separated from the Wind River, stretches along the entire eastern side of the park, and offers for more than 80 miles a bold unbroken barrier to all western progress, forming as it does a pathless and rugged tract with peaks and crags from 10,000 to 11,000 feet in height.

The Snowy range shuts in the Park on the north, and is separated by the valley of the Yellowstone River from the imposing peaks of the Gallatin range, which forms its north-western boundary.

In the sides of this rugged amphitheatre there are three main gaps, through which the rivers of the Park find their way out of the plateau.

The chief of these is the Yellowstone, which, issuing from the Yellowstone Lake,—a noble sheet of water in the centre of the Park,—flows northwards through its magnificent cañon, and, picking up tributaries on its way, leaves the plateau near Cinnabar, a small village in Montana just beyond the northern boundary of the reservation. At this point the Yellowstone is increased by the Gardiner River, and flows northward to Livingston, where it bends to the east and north and crosses the prairies to join the Missouri in North Dakota.

The second outlet for the drainage of the plateau is on the west, where the Madison, with its two main branches, the Gibbon and Firehole rivers, which carry off the warm waters from the principal geyser basins, flows outwards

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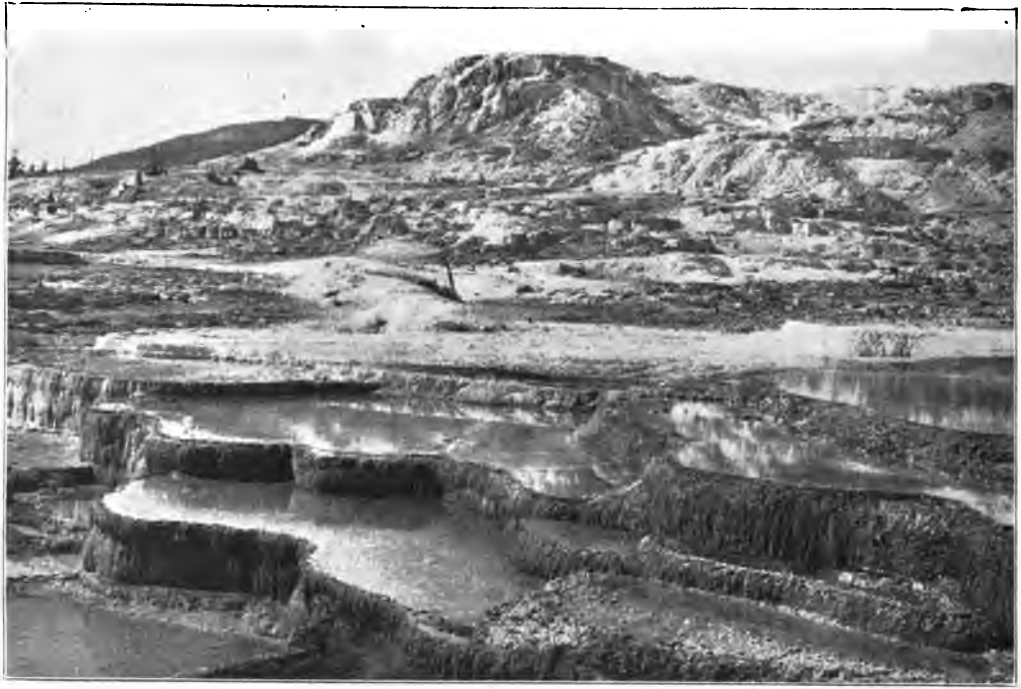
[1] For the description of the Tetons, see Baillie Grohmann, *Camps in the Rockies*, pp. 205-231.



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PULPIT TERRACES, MAMMOTH HOT SPRINGS, YELLOWSTONE PARK.

past the southern end of the Gallatin range, and thence, trending northwards, joins the head-waters of the Missouri in the northern part of Montana. The greater part of the Park is thus drained by rivers which ultimately find their way into the Gulf of Mexico, but the south-western corner of the region lies within the Pacific slope, and the great continental divide meanders between these streams and the source of the Columbia River on the west. The Snake River, or Lewis Fork of the Columbia, rises in the Shoshone Lake, a sheet of water about six miles in length, nestling among pine-clad mountains, and situated some 7700 feet above the sea. It runs southwards through the third gap in the plateau amphitheatre, between the Tetons and the Wind River range, and, trending southwards and westwards, crosses the wilds of Idaho and the great plains of the Columbia, ere it finally pours its mighty flood into the Pacific Ocean.

Among the many interesting natural phenomena and features of the Yellowstone region the hot springs and geysers hold the first place.

The Mammoth Hot Springs, and their deposits of white and brilliantly coloured calcareous sinter, which, seen from below, look like the front of a melting glacier or a vast petrified cascade leaping out from the midst of a forest-clad mountain side, present a profoundly interesting and impressive spectacle. On examining the Mammoth Hot Springs and their deposits more minutely, it is at once clear that the heat is diminishing steadily. One of the most striking objects is an obelisk-like stack of white sinter, which resembles a pile of old hats, and rises to a height of 43 feet above the flat hot-spring deposits that surround it. Liberty Cap—for such is its name—is the mouth of an old geyser, which has gradually built up a columnar rim of sinter around its orifice, as some of the geysers in the Park are still doing. It has, however, long ago died out, and remains only as a monument of former greatness and power.

On climbing the slope from Liberty Cap to the steaming pools at the summit, eight tolerably well-defined terraces are crossed. The largest of these—the Hotel Terrace—has an area of 83 acres, and each terrace or bench has a more or less level surface, bounded by a steep and richly ornamented face, which separates it from the terrace below. At some places the terraces exhibit exquisitely moulded clusters of cup-like forms with overhanging edges, from which thick fringes of snow-white stalactites droop in rich profusion. Some of the more perfect of these have a close resemblance to ornate pulpits—hence the name of Pulpit Terrace given to that part of the formation where the forms are most prominent.

Nearly all the hot springs issue from basins in the highest terraces.

The hot water boils up into basins, the edges of which become encrusted with the lime which is precipitated as the solution cools, and, as the cooling is most rapid round the rim, the basins become gradually built up and moulded into their peculiar scalloped configuration. As seen from above, these pools have the most exquisite and wonderful hues.

The water comes boiling to the surface all glistening with silvery bubbles, or wells up quietly from the crystal depths of funnel-shaped orifices, where it assumes the purest and most ethereal cerulean and emerald tints, and ere it reaches the edge of the basin it is wimpling quietly over a delicately frosted surface of calcareous sinter, here and there glistening in snowy whiteness, but oftener displaying a brilliant array of rich yellow, green, orange, red, and brown shades of colour, which sweep in long streamers over the rim and streak the front of the terraces for many yards below.

From the Mammoth Hot Springs our way led southwards up the Swan valley, a rugged glen between high pine-clad mountains, and entered the plateau through the Golden Gate, a deep gash in pale orange cliffs through which the west branch of the Gardiner River leaps down from the table-land above in a series of picturesque cascades. The principal geyser basins are situated on the plateau proper, 1000 feet or more above the level of the Mammoth Hot Springs. From the Golden Gate the road runs southwards along a comparatively level country with bright little lakes, the haunts of beavers and other game, and undulating expanses of grassy meadow and sombre forest.

The three principal geyser basins are stationed along the valleys of the Gibbon and Firehole rivers, which join to form the Madison.

In the Norris Basin, situated at the head of the Gibbon River, about 22 miles south of the Mammoth Hot Springs, there are some fourteen distinct geysers. Several of these lie in or near a flat depression in the forest, which resembles a lake frozen over with a crust of beautiful white, yellow, or pink siliceous sinter. Here and there the crust is dangerously thin, and is full of holes which reveal seething pools of brilliant sky-blue or emerald-tinted water.

The next objects that attract attention, after leaving the Norris Basin, are a collection of the curiously-coloured caldrons of boiling clay known as the Gibbon Paint-pots. There are in the Norris Basin several pools of ugly seething blue-gray mud, from which evil-smelling clouds of steam are constantly ascending, but the Paint-pots are neither ugly nor repulsive, and have many points of interest to recommend them.

From the Paint-pots the road down the Gibbon Cañon is wild and picturesque in the extreme, overshadowed as it is by heavily timbered slopes or bare cliffs, at some places 2000 feet in height. Little jets of steam and boiling pools keep us constantly in mind of the heated mass below, while the roaring stream, with its stony bed and foaming cascades, tells of the gradual gouging out of the gorge by the action of surface-waters above.

The Lower Geyser Basin, about 11 miles from the Norris Basin, and 4 miles above the mouth of the Firehole River, is the largest of the geyser areas, and covers a tract of some 9 or 10 square miles. There are here seventeen geysers, the finest of which is the Great Fountain, which, instead of issuing from a raised nozzle or conical mound of sinter, like most of the others, bursts forth from the centre of a shallow but perfect basin brimming over with sparkling water. The outer rim of the basin, about 40 yards in diameter, forms the top of a low platform some 3 feet above the surface of the surrounding level ground. The formation, entirely made up of siliceous deposits, is diversified by an endless array of forms and colours. At places the sinter is moulded into exquisitely modelled basins and pockets, which cluster round the rim and receive the overflow from the central pool. The basin itself is studded with beautiful tufted masses of sinter, like cauliflower heads, that rise through the water as little islets, and swell up near the central crater into gray rounded lumps of considerable size. The eruptions occur at irregular intervals, and we were fortunate in arriving just in time for a fine display. The water, after a series of preliminary jumpings, rose in an irregular confused conical mass to a height of 50 or 60 feet, as if made up of a bundle of jets each trying which could leap highest, while dense clouds of steam at times completely obscured the watery pile beneath. The whole performance lasted half an hour or so, after which the force of the eruptions diminished, and the agitated waters sank back exhausted, leaving the basin brimming over with a steaming, scalding flood, which gushed through all the apertures in the lip of the basin, and overflowed from one side pool to another, until it finally poured into the nearest rivulet.

All the more famous geysers are to be found along the valley of the Firehole River in the Upper Geyser Basin. This group comprehends no less than forty-nine geysers, each of which has received a distinctive name.

Of the larger geysers "Old Faithful" is the most celebrated, not because of his size, but because of the extreme regularity of the eruptions, which take place once every sixty-three minutes. Visitors are often disappointed at not catching the largest of the geysers in action, but Old Faithful never fails to perform, and sends his noble jet of water 125 to 150 feet into the air with unexceptional punctuality.

Retracing our steps, we returned to the Lower Basin and struck off eastwards up the glen of the East Fork of the Firehole Creek, crossing the water-parting between the basin of the Madison and that of the Yellowstone River.

The road over the ridge reaches the Hayden valley about 4 miles below the outlet of the Yellowstone Lake, and passes close to the Mud Geysers. The eruption which we saw was more curious than beautiful. A dark gray flood of muddy water welled up in the funnel-shaped throat of the geyser, and filled the basin that surrounds it, after which the liquid mass bulged up in a state of violent agitation, and spouted 15 or 20 feet high for several minutes, sending circular waves of dirty mud outwards to the rim of the basin.

There are several other mud geysers, or mud-pots, but there is one that surpasses all the rest in horrible ugliness. The Giant's Caldron, or Mud Volcano, is a crater some 20 or 30 feet deep in the face of a steep wooded slope a short distance from the Mud Geysers. In the depths of this caldron, with gray and slimy sides, a sable pool of noisome mud was continually heaving to and fro. On the side next the hill there opened into the bottom of the crater a low-mouthed tunnel, and from this grim cavern black waves of boiling mud were continually bursting forth with explosive violence. Each outburst was accompanied by a dismal kind of muffled grunt and a cloud of evil-smelling sulphurous vapour that rolled slowly up the side of the caldron, bleaching the face of the rock above the vent as it curled upwards. With all its efforts, however, the crater never overflowed, as the hideous flood sank back again into its subterranean cavern after the force of each explosion had spent itself.

The Yellowstone Lake is a noble sheet of water, some

20 miles in extreme length, and rudely resembling on the map a coarse hand with a knotty thumb and three fingers. It is situated 7741 feet above the sea-level, and is the highest lake of any size in the United States. The sombre pine forests of the plateau sweep downwards from the old volcanic mountains in the distance to the water's brink, and wooded islands are sprinkled over parts of its surface. Hot springs and bubbling paint-pots are found steaming around its shores, and it is possible to catch a trout in its well-stocked waters and boil it in one of its seething caldrons without moving a foot.

From the outlet at the north end of the lake the Yellowstone river winds quietly along the Hayden valley. After a comparatively tranquil course of some 18 miles, the river enters a steep wooded defile, and suddenly leaps down into a rugged gorge over a fall of 110 feet in height. A short distance further on it takes a second bound of 310 feet into the bottom of the Grand Cañon, where it dashes along between high rocky walls some 20 miles in length.

The great falls of the Yellowstone are indeed a noble sight. The water, like that of Niagara, is perfectly clear and free from sediment, issuing as it does from a great lake in which all suspended matter has been retained. It has a delicate sea-green hue, which contrasts delightfully with the warm tints of the surrounding precipices, while the great height of the fall appears magnified and ennobled by the dense volumes of spray which wrap round and quite conceal the base of the watery column.

The Grand Cañon of the Yellowstone, however, far surpasses in beauty anything else in the Park, and, indeed, few more striking and fascinating specimens of rock-colouring and sculpture have ever been described by travellers either in the New World or the Old. At the falls the depth of the gorge is about 700 feet, but this increases to 1000 feet 5 miles lower down; the height of the cañon walls nowhere exceeds some 1500 feet, while the mouth of the chasm varies from a quarter to three-quarters of a mile in width. It is not, however, the dimensions, which are in no way remarkable, but the wonderful colours and sculpturing that give to the cañon its peculiar interest. It has been gouged by the river out of a thick mass of the pale-yellow or pinkish rhyolite of the plateau, which has become softened and disintegrated by the action of the hot springs and fumaroles, many of which are still to be seen steaming along its walls.

As the rate of weathering is far from uniform throughout the mass, the parts which have proved most durable are to be seen projecting all along the cañon walls in a series of massive fretted buttresses, or jagged spurs and pinnacles, of the most ornate and picturesque configuration. The whole gorge is moreover painted in the most brilliant hues, from pale lemon or sulphur-yellow, which predominates, to deep orange streaked with warm vermilion, crimson, and purple, which, mingling with the deep green of the pines that clothe the brink of the chasm and are dotted over its rugged walls, make up together a picture of transcendent beauty and magnificence.

H. M. CADELL.—*Scottish Geographical Magazine*, May 1892.

By permission of Mr. H. M. Cadell and the Royal Scottish Geographical Society.

For a more detailed description see SYNGE, *Ride through Wonderland.* Sampson Low.

The Wasatch Mountains

The Wasatch system of mountains is composed of abrupt ranges, crowned with sharp peaks. The drainage of the whole area occupied by the Wasatch Mountains is to the Great Salt Lake. Great Salt Lake exists by virtue of the presence of the Wasatch Mountains, for the mountains wring from the clouds the waters with which the lake is supplied.

Walled by high ridges and peaks, many elevated valleys are found. In the midsummer months these valleys are favoured with a pleasant invigorating climate. Occasionally showers of rain fall. Vegetation is vigorous. The distant mountain slopes bear forests of spruce, pine, and fir; the broken foot-hills are often covered by low ragged pines and cedars. The flood-plains of the streams are natural meadows. About the springs and streamlets groves of aspen stand, and the streams are bordered with willows, box elders, and cottonwoods. When the short summer ends, the aspen and elder foliage turns to gold flecked with scarlet, the willows to crimson and russet; the meadows are quickly sered; early snows fall, and the whole land is quickly covered with a white mantle. The brief beautiful summer is followed by a long, dreary winter, and during this winter of snowfall are accumulated the waters that are to be used in fertilising the valleys away below in the border region between the mountains and the desert basins.

From the Wasatch on the north to the Colob on the south are elevated tables, in general bounded by bold, precipitous escarpments. These high plateaus are covered with sheets and beds of lava, and over the lava sheets are scattered many volcanic cinder cones. The higher plateaus bear heavy forests of evergreens, and scattered through the forests are many little valleys or meadow glades. In the midst of the glades are many beautiful lakelets, and from the cliffs that bound the plateaus the waters break out in innumerable springs. Here, also, a brief summer is followed by a long winter.

The Uinta Mountains constitute an east and west range. From a single great uplift, nearly 200 miles long and from 40 to 50 miles wide, valleys and cañons have been carved by rains and rivers, and table-lands and peaks have been left embossed on the surface. Along its middle belt the peaks are scattered in great confusion, but in general the highest peaks are near the centre of the range. The general elevation descends abruptly both on the north and south margins of the uplift, and at the crest of each abrupt descent are many limestone ridges and crags. Between these and the peaks that stand along the meander-ing watershed are broad tables, sometimes covered with forest, sometimes only with grass. This is a third region of short summers and long winters, where the waters are collected to fertilise the valleys to the north and south.

MAJOR J. W. POWELL.—*Report on the Arid Lands.* U.S.A. Government Publication Office, Washington.

The Great Basin

Between the Wasatch Mountains and the Sierra Nevada, extending northwards beyond the 42nd parallel, and southwards into Lower California, lies a district considerably larger than France, which goes by the name of the Great Basin. It has received this name simply from the fact that none of its rivers enter the sea. The Great Basin is shaped like a triangle, whose apex points to the south or south-west. From this apex the ground rises from the level of tide-water to 5000 feet or thereabouts in central Nevada; and this is about the general level of the whole country between the Sierra Nevada and the Wasatch Mountains in the broad part of the Great Basin.

There is great uniformity throughout the whole of the country; the surface is covered everywhere with short ranges of volcanic mountains of recent origin. In crossing the Great Basin from Donner Pass in the Sierra Nevada to the Wasatch range at Salt Lake we passed over no fewer than twenty of these ranges, the basin at that latitude being 700 miles across. They are mountains in miniature, beautiful in outline, variegated by many-tinted rocks, and usually perfectly bare of trees, or even shrubs. The average width of the ranges would be about 12 miles, the height above the general level of the basin from 1000 to 4000 feet.

The valleys are mostly about 20 miles wide, and often of great length; but more frequently they are limited above and below by transverse ranges, sometimes washed down to very inconsiderable dimensions, so as to form a number of separate little basins. The well-preserved water-marks everywhere visible indicate extreme dryness, upon which dryness most of the peculiar characteristics of the country depend. Artemisian scrub (sedge brush) and grease-wood alone spring from the dry, parched earth, except where a stream of unusual persistence supports a row of cotton-wood trees and a few acres of grass. From the decomposition of volcanic rocks, the soil in its ingredients is very rich, and, where irrigation can be supplied, yields most abundant crops. There are broad level districts, called alkali flats, which are covered with salts, usually nitrate of soda. These white, glistening sheets, in the dry, unsteady atmosphere of the desert, form the most tantalising mirages to which a thirsty traveller could be exposed.

The plateaux of the basin region were undoubtedly the last portions of the western continent raised from the sea—the last from which the Gulf of California retired. When the Great Basin emerged from the water, there were dry lands and mountains east, west, and north of it, shutting out from it the moisture of the Pacific Ocean, as well as any that might travel thither from the far-off Gulf of Mexico. A sufficient quantity of rain never fell upon the basin region to form a complete system of drainage from the highest lands down to the sea. It is not because the Great Basin is really a complete basin without an outlet, or with a rim presenting an insuperable barrier, that its waters do not escape to the sea, but because it is not a single basin at all, but a collection of basins, each with its stream and its lake at the end of it, and because the separate streams have never had force enough to break through the barriers which all streams have at first to encounter, and so unite their waters, so as to form a complete drainage system.

The drainage of the Great Basin, then, is in a primitive stage, and will probably always remain so. Wherever there are lofty mountains in this region, we are pretty certain to find a lake proportionately great. If the lake has no outlet, it of necessity contains salt water, which becomes salter and salter from the concentration, by means of evaporation, of the salts washed into it from the decomposed rocks of the mountains. When the lake has an outlet the water is, as usual, fresh. Great Salt Lake is an example of the former, Utah Lake of the latter. Most of the lakes, however, are not permanent; they form broad sheets of water after rain, but are perfectly dry and barren during the greater part of the year. They vary greatly in elevation and size. The Great Salt Lake, the largest in the basin, is about 60 miles long by 10 broad. There is abundant evidence all around it to prove that in former times it covered an area twice, if not thrice, as large as at present.

The largest stream in the Great Basin is the Humboldt, which is more than 500 miles long, and passes from east to west across the entire country before emptying itself into Humboldt Lake.

W. A. BELL.—*New Tracks in North America.* Chapman and Hall.

Life on the Colorado Plateaus

The Colorado plateaus occupy the region south of the Uinta range in Utah, New Mexico, and Arizona, and include the country drained by the Colorado River and its branches.

The general altitude of the country is over 6000 feet, much of it approaching 7000, and the higher mountains approaching 9000. Within such a range, approximating 3000 feet, the climatic variations are great; but yet certain aspects are almost everywhere present at all times. The general grayness of the landscape, the clear blue of the air, the absence of rain, and the desiccation of one's skin, are perhaps most striking to one coming into the country by day. While one is absorbed with the beauty of the colour effects of land and sky, he is at first unconscious of any bodily discomfort. Shortly, however, the dryness of tongue, throat, and nose, and the soreness of the lips, that sting as if burnt, cause one to realise that it is indeed a dry country. Occasional bleeding at the nose, and cracking of the lips, are natural and not unexpected results of the climate.

It is, however, at night that the most beautiful effects of the dryness are seen, for then the heavens seem literally crowded with stars. The moon shadows are clear and sharp, and the Milky Way is not a hazy, nebulous accumulation of patches of light such as we know it in the moist East, but a brilliantly lighted area in the heavens, with deep, dark patches, looking like interminably deep holes. The stars shine large and clear without twinkling, and disappear in an instant behind the hills and mesa tops as the earth rolls eastward. There is no lingering in the setting such as we expect in the East.

Next to the climatic conditions, the topographic features strike the eye of the newcomer. The scale of the land forms is large, and all the conditions conspire to give an idea of vastness, which is almost overpowering. Soon however, the traveller sees that the country may be divided into the great plateaus, rolling and approximately level, ending on one side in a great cliff escarpment perhaps hundreds of feet high, and gradually dropping on the other to the general lowland level. These plateaus may be surmounted by occasional mesas of a similar form, but lesser size, and cut into by streams—perhaps, however, only wet weather torrents, running in deep or narrow trenches, or *arroyos.* Only in the larger valleys are the streams constant, as for instance in the San Juan, which is a broad, shallow, sandy stream much used for irrigating. In the smaller streams water appears in dry times only in occasional holes or pockets, or is seen not at all. Similarly in the plateaus, water is absent, except for an occasional shallow yellow lake, that is usually an object of great interest and importance, offering as it does, perhaps, the only means of securing water on a long march. In some of the larger dry stream-beds the sands blow along under the impulse of the almost constant wind, until in some lee they accumulate in a great wind-rippled dune of snow-white sand, rivalling in size and beauty some of the famous dunes of our Atlantic shore.

The mesas usually rise abruptly and almost perpendicularly from the plains, except where protected by fallen débris in a talus slope. Between often lies a flat adobé plain cut into by the river to a depth of from 30 to 50 feet, the streams being dry except at occasional intervals. The mesa walls are made mostly of a coarse brown sandstone that, from its aspect and its effect on the topography, would seem to be a strong rock. This apparent strength is contradicted by the ease with which one can rub a piece into fragments with one's thumb. That the rock has been friable and easily worked for a very long time is shown by the abundant drawings made by the ancient and modern people, either in the form of a design, or in a rude series of irregular scratches, perhaps incidental to the sharpening of their stone tools.

The edges of the mesas are very irregular in outline, and very picturesque in appearance. In places great buttresses stand out, almost separated from the parent mass, and sculptured by the work of the atmosphere and sand into forms of great variety and beauty.

The highest altitudes, particularly on the larger mesas or mountains,—as, for instance, in the Chusca Mountains, near the Arizona-New Mexico line,—are occupied by heavy forests, especially of the large white pine. Here the precipitation is comparatively heavy, and the rolling flat meadows in the forest clearings are covered with green grass, making excellent pasturage for cattle, sheep, and goats. In the lower parts of the glades are frequent clear lakes that make the region one of great beauty, and in striking contrast with the lower gray, sandy, arid areas. On the slopes of these high mountains are good streams and plenty of water, so that the Indian inhabitants have all the conditions favourable for prosperity, at least in the summer. Here the Indians live in so-called villages and groups in the summer, going to lower regions in the winter, and taking their flocks with them. Here the pasturage makes the keeping of stock easy, and here the Indian can, with but very little effort, raise a fair crop of corn and secure all the necessary fuel.

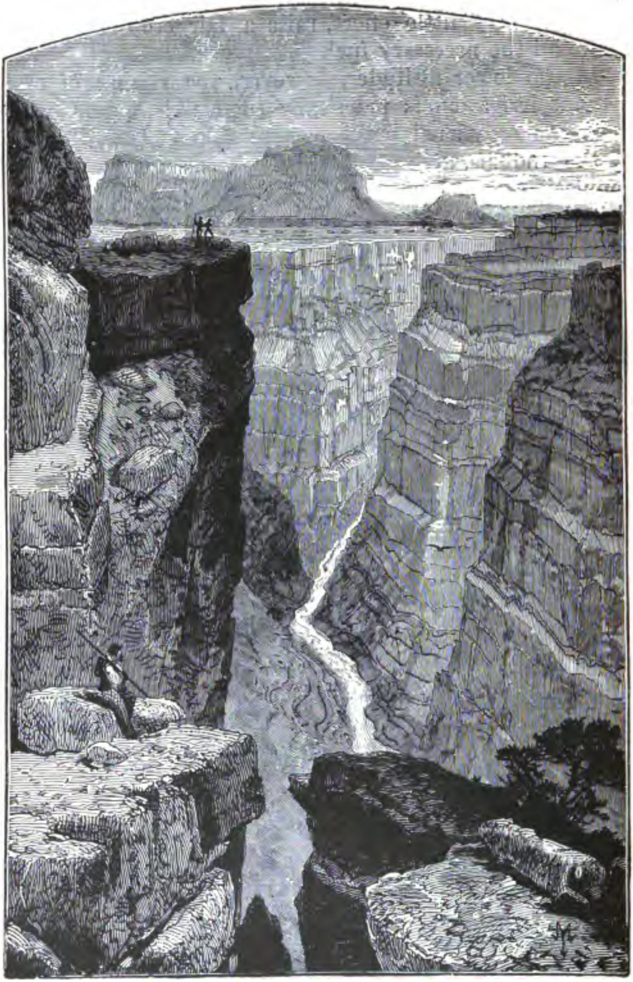
In the lower altitudes, however, the raising of crops without irrigation is practically impossible, except where there are occasional moist spots, which are usually tilled by the Indians, and watched with great care. Thus the population in summer is more scattered in the lower altitudes than in the higher, and one can say that an Indian's home is a sign of water near by. Where irrigation is possible to a large extent, we find the whites living in pleasant villages and raising grain, vegetables, and fruits of all kinds, and in great abundance. Each house has its own branch ditches from the irrigation canals, and is usually surrounded by a thrifty garden.

SPENCER TROTTER.—*Journal of School Geography,* 1900.
By permission of Professor R. E. Dodge.

The Grand Cañon of the Colorado

No picture has ever conveyed an idea, language there is none that can ever give an adequate conception, of the ensemble of this great chasm—its vast proportions, its intricate plan, the nobility of its architecture, its colossal buttes, its wealth of ornamentation, the splendour of its rich colours. It is not a cañon at all that you see—the word belittles the scene; it is a labyrinth of an infinite number of chasms and cañons that press themselves upon your view all at once—a mighty mountain country filled with most fantastically carved, gigantic rock masses, cyclopean castles thousands of feet in height, gracefully towering Gothic cathedrals, round-topped Moslem mosques, Greek and Indian temples, frowning rock cities, pyramids, and obelisks, battlemented fortresses,—all the wonders of the Arabian Nights multiplied and heaped together in a wild chaos, stimulating your fancy beyond its power.

And not only does the ensemble present the most stupendous sight; even the least imposing portions of the



COLORADO CAÑON

cañon are as impressive as any scenery that can be found in the world. For 200 miles of the river-bed, with a breadth of 10 to 12 miles or more, is here revealed the interior of the workshop of nature and the secrets of the building up of our earth's crust. The surrounding plateau country is scored by intricate masses of side cañons. In these and in the main chasm, to a depth of 6000 to 8000 feet, geological history is exhibited in precipitous walls with a clearness unparalleled in any portion of the world, telling of æons of rock-building and of millenniums of rock-carving by wind and water. Far below, hardly recognisable, if at all visible from above, flows the great river which in its ceaseless rush has carried to the sea the sands and débris—results of the denudations of more recent formations; has cut through the pale gray limestones of the Permian, the pink and brilliant red sandstones and the purplish and vermilion limestones of the Triassic, the deep-brown rocks of the Carboniferous, down to the sombre, iron-black granites of the Silurian and Archæan ages, through which the river now rolls its yellow waters, gathered from thousands of square miles in the mountains of Colorado and the plateaus of Utah and Arizona—here in placid and majestic dignity, there with a wild current in roaring rapids, over boulders and rocks and precipitous falls.

B. E. Fernow.—*National Geographic Magazine*, 1897.

By permission of the National Geographic Society.

The Mojave Desert

A night at the rather pretty little railroad town of Needles, and I started off again into the grim Mojave desert. It was the beginning of 200 miles whose sufferings far outweighed all that had gone before. There were five telegraph stations in that awful stretch, and the largest town in 160 miles had three houses.

The glare of that desert sun was murderous, and still worse the reflection from the molten sands. At last I took to walking nights, since there was a full moon, and trying, with scant success, to sleep by day.

That night, to make a short cut, I tramped through a long, low range of the peculiar hills of the desert. As I trudged along over the white sand, or the areas of black volcanic pebbles, the moonlight gleam on some peculiar object drew me over a few hundred feet to the right of my pathless course. As I came nearer and nearer, a thrill of awe ran through me. As I knelt on the barren sands and lifted that bleached and flinty skull, there rose before my eyes the tragedy of that Golgotha, vivid as day.

I saw the summer glare of the merciless desert, the sun like fire overhead, the sand like molten lead below, the slow ox-teams of a little band of immigrants toiling in agony across that plain of death. I saw the gaunt faces as the blood-warm water in the kegs fell lower and lower, till one desperate man set out to seek for water among the nearest mountains. I saw him plod on through cañons drifted high with sand; over sharp, rocky spurs and down desolate defiles; tearing up with trembling hands the sand of some mountain *arroyo*, only to find them still parched and burning. He struggled on for weary miles, gasping, burning, failing in strength and courage, until nature could no more, and he sank exhausted upon the bare ground.

Next day the lying mirage nearly fooled me to a like end. My water was gone, and all day I had been half-dead with thirst. And down in yonder seething valley I saw a broad blue lake, its very ripples visible as they danced in the westering sun. But I knew that there was no water there, simply because so large a lake does not exist in the desert. And so, with tottering legs, and blear eyes that dared not look back, and cracked lips and tongue, I ran away until out of sight, and after two fearful hours fell exhausted under a tank by the railroad.

This is a country of strange things; but none stranger than the appearance of its mountains. They are peculiar in the abrupt fashion in which they rise from the plain, and more so in their utter destitution of vegetable life in any form. Strangest of all is their colour. The prevailing hue is a soft dark-red brown, or occasionally a tender purple; but here and there, upon this deep background, are curious light patches, where the fine sand of the desert has been whirled aloft and rained down upon the mountain slopes, where it forms deposits scores of feet in depth and acres in extent. These mountains are not very high—none, I should judge, over 5000 or 6000 feet—but very vigorous in outline, and, at certain stages of the daylight, very beautiful in colour. Nearly all, too, are rich in mineral, and will pay if the water problem is ever solved.

C. F. Lummis.—*A Tramp across the Continent.* Sampson Low.
By permission of Messrs. Sampson Low.

The Navaho Indians

A reservation of something like 12,000 square miles has been set apart for the Navahoes in northern New Mexico and Arizona; but they spread beyond the reservation on all sides, and may be found in southern Colorado and Utah.

Owing in part to the character of the country and its climate, the Navahoes are still blanket Indians, never being seen away from their homes without this necessary and convenient article of dress. The small children take their lessons in blanket-wearing early in life, and practise the manner of using it as they do the throwing of a rope.

The manner of dress of the Navahoes, apart from the blanket, is simple and serviceable. The men wear loose shirts and trousers, the shirt usually made of gaudy, large-figured calico, and the trousers, if home made, usually of white cotton cloth, split up the outside of the leg nearly to the knee. A band of bright-coloured cloth about the head, buckskin leggings, and moccasins complete the raiment, except for the customary ornaments. The dress of the women is very like that of the men, except for the long skirts and the customary sash.

Men and women are very fond of ornaments, especially of silver and turquoise. The native smiths, with their crude furnaces, make very handsome rings, throat pendants, buckles, etc., which are largely worn, especially on public occasions such as great feast days. Ornamentation, however, is not confined to the person, but the inevitable and necessary horse is also well bedecked with silver-mounted bridle, reins, and saddle by those who can afford such riches. As money is not hoarded, such ornaments are the principal form of personal property, next to their sheep, goats, and horses.

In such a country as this, where water and the other necessities of life are scattered and liable to vary according to the character of the season, it is of course to be expected that the people must be nomadic, and permanent homes an impossibility. This is true to a large extent. The Indians live mostly in rude timber and adobé, or stone and adobé houses, known as *hogans*, in the winter, and in open, more exposed hogans in the summer. The hogan has but one room, with the fire in the centre, but is well built, and in a way comfortable. There is little need for any protection except from heat and wind in the summer, so that the open hogans are more comfortable then. Some of the Indians live in the conical tepee, known as a *wicky up;* but the hogan is the typical Navaho home.

The hogan not only is perhaps the best wind-proof and cold-proof house possible with the building materials available, but it is particularly appropriate in other ways. Being covered with adobé, it is very similar in colour to the surrounding land, and one may pass very close to a hogan without seeing it, particularly as the women and children keep out of sight if no male member of the family is about. The hogans are placed if possible near to good pasturage and to water, and are sometimes in small groups. As the construction of a hogan is a simple matter, the people can move as their needs may require, without leaving behind any wealth stored in a useless house. Again, as the Navahoes have a superstition that a house is accursed in which a human being has died, temporary shelters are much to their liking.

The industries of the Navahoes are few and simple; but as men and women are thrifty as a rule, the wealth of the tribe is unusually great. The principal industries are sheep and goat raising, together with a certain amount of primitive agriculture, and the raising of ponies for their own use. The sheep and goats form their chief food supply, and the sheep furnish them their greatest riches. The wool is either made into the famous Navaho blankets by the women, or is sold to the white traders in exchange for necessities and many luxuries.

The blankets are woven in a rude wooden loom, often set up in a primitive sun-shelter in the open, and all the implements are very simple. The steps of preparation of the wool are many, and the process, including the dyeing of the wool, a long one. The weaving is done without any set design, the pattern being worked out as the weaving proceeds. The colours are often brilliant, but reds, greens, blacks, grays, and whites predominate.

The life of the Navahoes is one of irregularity, as they eat and sleep when and wherever opportunity offers. They live largely on corn, meat, and canned goods bought at the Indian stores, and as their food is often poorly cooked and taken at irregular intervals and in varying quantities, the adults are frequently sufferers from some stomach trouble. Nothing appeals to a Navaho like a feast, and the surest way to win your guide or your workman's good graces is through a "square meal." Indians will travel miles to a feast, or *fiesta*, practically fasting days beforehand and gorging during the feast.

R. E. DODGE.—*Journal of School Geography*, 1900.

By permission of Professor R. E. Dodge.

The Sierra Nevada of California

The most southern glacier in North America, so far as known, with a possible exception of perennial snow and ice about the summit of Popocatepetl in Mexico, occurs amid the most lofty peaks of the High Sierra in eastern California. In that region there are several peaks, such as Mount Lyell, Mount Ritter, Mount Dana, etc., which attain elevations of over 13,000 feet. These splendid summits are white throughout nearly the entire year, but in late summer, when seen from the southward, they seem to be completely bare of snow. On their northern sides, however, in the shelter of great cliffs, small snow-fields may be seen from a distance at the season of greatest melting; but if one visits these snow-banks, as they appear to be from a distance, he finds them to be actual glaciers. They are small, but present many of the characteristics of even the largest ice-streams of the alpine type.

Mount Shasta is a volcanic mountain with a double summit, standing west of the north extremity of the Sierra Nevada, and distinctly separate from that range. This splendid peak, rising in its solitary grandeur to a height of about 14,500 feet, is white with snow through the year, and from its summit gives origin to five glaciers.

PROF. I. C. RUSSELL.—*Geographical Journal*, Dec. 1898.

By permission of the Royal Geographical Society.

Yosemite Valley

The Yosemite lies in the heart of the Sierra Nevada Mountains, about 150 miles due east from San Francisco. The valley is distinguished from all other valleys by its enormous depth, the perpendicular walls that enclose it, and by the small amount of débris at the base of these walls.

Our first object of interest, when we reached the valley floor, was the Bridal Veil Fall. A stream of water flowing through meadows and forests from a lake 30 miles away comes to the precipice with a width of 40 feet, and a depth that varies with the season of the year. It leaps over the precipice, and falls in filmy folds down 900 feet upon rocks and foaming waters. The wind floats out the wreaths of spray, and in the afternoon rainbow circles form in the hanging clouds of vapour, and the whole place sparkles and gleams in the sunlight.

Alongside the road, just beyond, are the Cathedral Rocks, which bear a striking resemblance to the Gothic piles of England. Portions of these massive towers, which rise 2700 feet from the valley, have fallen and lie scattered in massive fragments at the base, and huge fissures in the rocky pinnacles give evil omen of similar disasters. As we look across the green, swiftly-flowing Merced, rises the immense wall of El Capitan, forming the north wall. It is by far the most imposing feature of the valley, 4000 feet high, of a cream-coloured stone—a sheer, incurving precipice from base to top. The plants and herbage which find a place everywhere in the valley are so small upon El Capitan that the impression is produced of a structure vaster than the Sphinx or the Pyramids. It is the giant of the place. On the same side are three lofty and immense pillars of granite, the highest of which equals El Capitan in altitude. Opposite, the Sentinel towers 3000 feet high. By a curve in the valley, the Sentinel is brought into its centre, and from either part he stands majestic, lofty, and grandly formed, the guardian of this wonderful treasure-house of nature. From the base of the Sentinel, the finest waterfall, the Yosemite Fall, which gives its name to the valley, is seen to great advantage. The Yosemite River flows between granite walls, from the lofty heights where snow lies more than half the year, till it comes to the precipice far above the forest line, where it pours over—a deep and powerful stream, falls into a broad basin, boils for a moment, and then plunges down, to repeat its leap once more before it reaches the valley. The first fall is a sheer descent of 1500 feet, but the whole height, from summit to base, is 2600 feet. From some points in the valley the three leaps seem merged in one vast mass of milk-white, foaming water, and seen in the moonlight the effect is beautiful beyond description.

The view from the Sentinel point up and down the valley is magnificent. The northern view is closed by Cloud's Rest, which rises 6000 feet into the sky. Nearer are North Dome, Royal Arches, and Washington Column on the left, and Glacier Point with its dizzy promontory on the right, while between the two the graceful Half Dome rises nearly 5000 feet.

At the other end of the valley are beautiful cascades, and the drive from Mirror Lake, where the huge mountains are pictured in all their grandeur, is never to be forgotten.

C. A. STODDART.—*Beyond the Rockies.* Sampson Low.
By permission of Messrs. Sampson Low.

For fuller descriptions see MARSHALL, *Through America*, chap. xviii., xix.; FINCK, *Pacific Coast Scenic Tour*, chap. vii, Sampson Low.

Climate and Vegetation of Southern California

The present writer spent the entire months of June and July 1889 in southern California without experiencing a single day when there was not the most balmy and delightful sunshine. The temperature is often pretty high, between 80 and 90, but in the neighbourhood of the sea it is tempered by a delightful sea-breeze, which seems to make the heat absolutely harmless. People are able to work in the open air without injury at a temperature that could not be endured elsewhere. The present writer found to his surprise that in the very heat of a summer day he was able to take considerable walks over the fields and roads, not only without fatigue, but with something of that sense of invigoration which one has on the mountains of Switzerland. The summer mornings and evenings are especially delightful. The sunset is seldom gorgeous, as in cloudy regions, but the horizon burns with a rich orange hue that sends a glow over the mountains, and lights up sea and land and sky with a wonderfully pure and mellow glory. Very beautifully do the tall eucalyptus and the graceful hanging pepper trees stand up against the evening sky.

As a small set-off to this, we must mention an evening and morning fog which steals up from the sea, but is soon scattered by the morning sun. It is, of course, most marked in the neighbourhood of the sea; further inland and in higher regions it is not experienced. In some degree it may be unfavourable to health; it slightly retards the ripening of fruit, and it makes such places less suitable for the drying of fruit—at least in the open air.

But it is for its winter that the climate of southern California deserves to be spoken of in the superlative degree. Except when the rain falls, there is hardly less sunshine than in summer. Nor is there much less heat by day. The nights are decidedly colder; the days do not differ much from summer days.

It is easy to see how a climate so constantly balmy and sunny must be admirably adapted for fruit. And, indeed, there is hardly any kind of sub-tropical fruit that may not be easily raised in great abundance. Oranges, lemons, grapes, apricots, nectarines, quinces, plums, figs, walnuts, pomegranates, limes, as well as more common kinds—apples, pears, melons, raspberries, strawberries, etc.—flourish in almost every situation.

The soil of the country is almost equally favourable to the growth of fruit. Southern California has several ranges of mountains, including the Sierra Nevada, the Sierra Madre, and the coast range. Between these mountains lie the valleys which form not only the agricultural but also the horticultural regions. The mountains themselves have as yet been turned to little or no use, although the time will probably come when they will be made use of for timber, for pasture, and, on their lower flanks, for crops. There is such abundance of rich lands in the valleys that the mountains must bide their time. Most of the valleys seem to have been the beds of ancient lakes, into which the vegetable matter from the mountains was washed, and so deposited as to form a soil of unexampled richness and abundance. Of course it is not all of equal quality. Some of it is sandy and barren. Some of it is impregnated with alkali, and therefore unproductive. Some of it is mixed with clay, the *adobé* of the natives, furnishing material for their adobé houses. But a very large portion is like the finest garden mould, pulverised like mole-heaps, easily ploughed, easily worked, and of almost unexampled fertility. There are places where this rich mould is of immense thickness, some say hundreds of feet. It is no uncommon thing, where the remains of an ancient "wash," or river channel, have ploughed up the soil, to observe a bank of vegetable mould 12 or 15 feet in thickness. The resources of such a soil are almost exhaustless. Where irrigation is applied, it is easy to get two crops in a year of any kind of farm produce. Alfalfa, a kind of clover known at home as lucerne, may thus produce eight crops in a season.

This remarkable soil is favourable in many ways to the growth of fruit. The roots spread out freely, finding nourishment everywhere, and they penetrate deeply for the same reason. And in this way they get the benefit of the water-supply, which is often considerably below the surface.

In other ways the marvellous qualities of the soil are abundantly apparent. One of the most striking proofs of it is the rapid growth of trees. The most common trees are the eucalyptus or gum tree in its two varieties, blue gum and red gum, and the pepper tree. The eucalyptus makes a growth of 8 or 10 feet a season. In five or six years it is a tall, handsome tree of 40 or 50 feet. The pepper tree does not grow so tall, but it is more bushy, and its hanging festoons make it more ornamental.

A settler planting some of these trees in the very heart of a wilderness is in possession of a clothed and cosy domain in three years, with timber as well grown as it would be in twenty years in most countries. The growth of shrubs and flowers is on a corresponding scale. A friend of mine at Santa Monica told me that after the rain set in he measured the growth of a creeper in his garden, and found that in four-and-twenty hours it had made 10 inches. If you stick a sprig of marguerite in a corner of your garden, it will grow to the size of a gooseberry bush, covered with thousands of flowers. Geraniums grow, almost as a weed, to the size of shrubs, and are one blaze of blossom, large and brilliant. Roses flower all the year round. In uncultivated ground many species of natural flowers that we have to rear with the greatest care flourish in rank luxuriance. Wild mustard fulfils the conditions of the parable in Scripture, and is both a beauty and a nuisance. Visiting a new ranch in the valley of San Bernardino, we found that the sunflower was the weed with which the farmer had chiefly to contend, covering whole acres with grand plants that formed a vast golden blaze. Traversing the railroad in the Mojave desert, between Sacramento and Los Angeles, we saw whole hillsides white with the flower of the *Yucca gloriosa*, the stems 12 or 15 feet in height, and the beautiful white bells hanging in massive clusters, each plant a model of symmetry. Even among the weeds by the dusty wayside you come ever and anon on some gem of lily white that might adorn the bosom of a bride, and in the mountain thickets, convolvulus of incomparable blue and purple, cactus of peerless crimson, and annuals of such variety of form and brightness of hue that you get a new idea of the resources and prodigality of nature.

Southern California is a contrast to most other countries in this, that it shows far best in winter. Winter is the season of greenness and freshness; in the heat of summer the mountains and valleys, too, when in a state of nature, are withered and burnt up. In summer, although there are many elements of beauty in the country, the eye gets wearied with the stretches of brown, withered vegetation that present themselves everywhere, except where the land has been reclaimed by the industry of man. But in winter, after the rain, everything becomes green and bright, and in spring the blaze of colour is overwhelming. In winter most of the trees retain their foliage. Neither the eucalyptus nor the pepper tree is deciduous, and the orange groves and olive groves are as green as ever. About the homesteads, therefore, where these trees prevail, there is none of that barrenness and death-like look which most of our woods present in winter. Snow is not known—frost only, and very rarely, at night. It is little wonder that those that have been accustomed to the long rigour of a New York or a Canadian winter, find southern California a paradise.

W. G. Blaikie.—*Scottish Geographical Magazine*, April 1890.
By permission of the Royal Scottish Geographical Society.

San Francisco

There is no doubt, when once the site is understood, as to why San Francisco is located just where it is. It has the only natural harbour between Astoria (Oregon) to the north, and San Diego to the south. It bears besides, with this advantage, such a relation to the resources of the back country that it could not escape a destiny of greatness. It is not simply a bay we have entered upon, but an inland sea with a great commerce of its own. Immediately in front rise round-backed Goat Island and Angel Island, resembling monsters asleep; and terraced Alcatraz, with its citadel, as picturesque as a bit of Malta. Vistas open on many sides, with gleams of light falling on white cities under lowering atmospheres of smoke. San Francisco, close at hand, piles up impressively on steep hills, its bristling structures covering their undulations sharply from neighbouring hills. The waterfront is full of shipping. Craft of all shapes and sizes cross one another's wakes in the harbour. The lateen sails of Genoese and Maltese fishermen and the junks of Chinese shrimp-catchers are among them.

The city does not begin directly at the ocean, but a mile or two within. It follows the inner shore of a long narrow peninsula, which comes from the south to meet one coming from the north, and forms with it a strait and bay.

It is indeed an inland sea, this bay. You go southward upon it 30 miles, northward as far, and 30 miles

SAN FRANCISCO.

north-eastward to the Straits of Carquinez, which has Benicia on one side and Mattinez, the point of departure for ascent of the peak of Mount Diablo, on the other. Through these straits you pass again into Suisun Bay, which receives the waters of the Sacramento and San Joaquin Rivers, and is itself some 20 miles in extent.

MRS. BISHOP.—*Old Mexico and Her Lost Provinces.* Harper Brothers.

By permission of Messrs. Harper Brothers.

VIII. MEXICO

Mexico

BOTH the topographic and geologic features of Mexico are an extension of the western cordilleran systems of the United States. The ranges of the Rocky Mountains continue across the Rio Grande as the Sierra Madre of the East, and find their ultimate terminus in the neighbourhood of Tampico, midway of the eastern Mexican coast. The Sierra Nevada of California and the Basin ranges of Arizona, after merging and almost disappearing in the deserts about Mojave and Yuma, gain magnitude as they continue in the Sierra Madres of the West to the Rio Lerma, near San Blas, midway of the Pacific coast. Between the two great Sierra Madres is the southern extension of the cordilleran plateau of the United States. These two mountain systems unite in southern Mexico in the group of gigantic volcanoes which extends from the Pacific Ocean to the Gulf of Mexico.

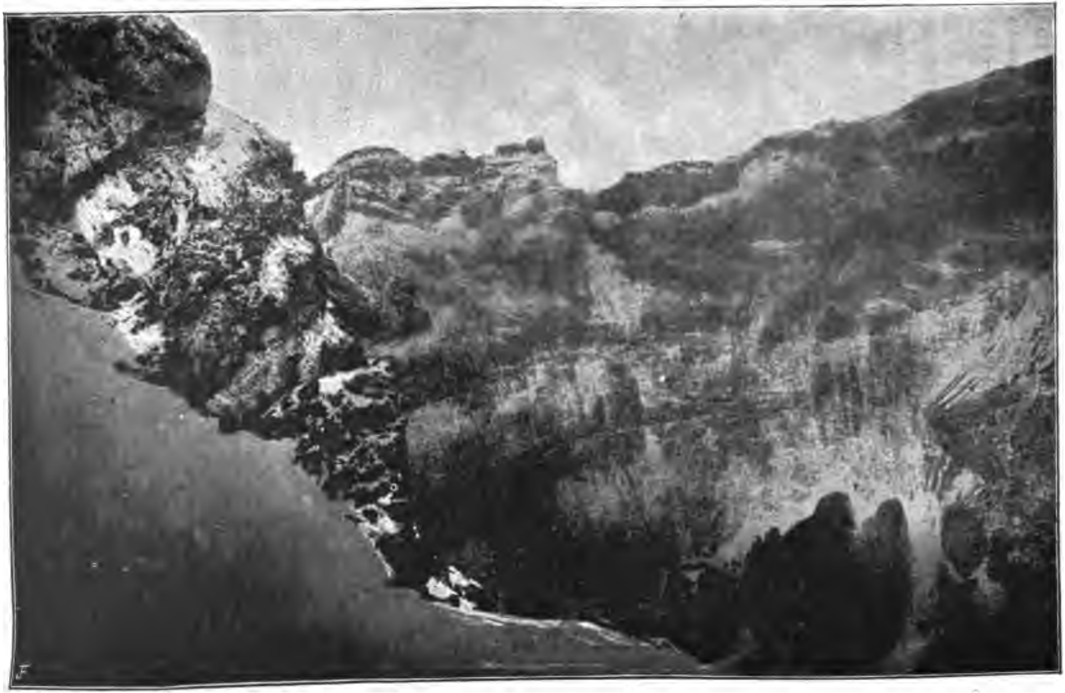
According to common belief, central Mexico consists of a vast plateau. In reality it is a great basin of depression, ribbed with many irregularly disposed and disconnected mountain ranges, buttes, and isolated ridges, separated by broad valleys and plains. Many of these plains are the beds of ancient lakes, like those of the Salt Lake or Humboldt valleys in Utah, and have no drainage outlet to the sea. The basin-like character of this central region is accentuated by the mighty mountain barrier of the Sierra

Madre, which towers above it on the west, by the lesser and more disconnected Sierra Madre of the east, and the gigantic volcanic cones which dominate it on the south.

A glance at the basin valleys of Mexico, near the southern borders of the Republic, shows that there they have their least altitude and their greatest area. Like the neighbouring portion of the United States, the region consists of vast desert plains, relieved by narrow mountain ridges, or by the rugged outlines of faulted mesa edges, cut by the many cañons which mark the drainage lines of the country. Southward the plains of the basin region diminish in area, while its desert mountains increase in number and altitude. Towards the geographic centre of Mexico the plains dwindle to large intramontane valleys, until finally, in the neighbourhood of Zacatecas and Queretaro, they are but narrow valleys separating giant mountain ranges.

Towards the northern boundary of Mexico the Sierra Madre Mountains of the east attain their least height, and are entirely devoid of cordilleran aspect, consisting of isolated ranges and lost mountains, and merging near the neighbourhood of the Rio Grande into the desert plains and mesas of western Texas and southern New Mexico. Southwards, near Monterey, they begin to lose their disconnected character and to form a more united and conspicuous mountain mass, and but 150 miles farther south, below Victoria, they unite in a superb elevated mass where culminate all the topographic characteristics of the west. To the north the cordilleran type is lost in isolated cerros, the peculiar forms of which are typified by "La Silla," or "The Saddle," near Monterey, which is by far the most conspicuous feature in a mixture of desert plains and jagged hills. The general character of these desert sierras is bold and striking, as is well shown by the names given them.

To the east is an extensive and rugged decline which slopes for 50 miles and terminates in the coastal plain of



CRATER OF POPOCATEPETL.

the Gulf of Mexico, over a mile vertically below. To the south the Sierra Madre of the east continues to rise in stupendous mountain masses, which culminate in the volcanic cones of Orizaba and Popocatepetl. To the west are the vast arid deserts of the central basin region, glistening with huge patches of dazzling white, the dried and alkali-incrusted beds of ancient lakes, bristling with a scanty growth of sage brush and cactus, and mottled with rugged mountain forms.

One of the most forbidding of the numerous varieties of cacti which clothe this region is the "ocatea," which resembles a cuttle-fish buried to his nose in the earth, only his arms waving in the air. These are from 5 to 15 feet in height, the whipstock arms being without branch or joint, but covered close as they can be set with heavy recurved thorns like tigers' claws, and almost as large. Then there is the "tree yucca," big of trunk, and branched like an oak, and bearing on the end of each arm a bunch of bayonet-shaped leaves, the dead stems of which form the bark, and are so dry that, when lighted, the whole flames up. And finally, there is the "pita haya," mightiest of cacti, which, as single stems or branched, looks like great green telegraph poles or giant candelabra.

The Sierra Madre of the west, like those of the east and the central basal region, are least conspicuous, and attain least altitude near the northern border of Mexico. Along the international boundary the hills are disconnected and without regular system, the highest summits rarely reaching 6000 feet in altitude; thence southward these hills mass together in most irregular and confusing manner, increasing in height and number, until in northern Durango and Sinaloa they have assumed cordilleran proportion and height.

Close to the city of Mexico is the mightiest of North American mountains, Popocatepetl, the altitude of which is 18,020 feet. The best view of this magnificent peak is perhaps obtained from the Aztec pyramid at Cholula. Near here is the peak of Iztaccihuatl, the altitude of which is 17,290 feet, best seen from the plains of Amecameca. Finally, from the main street in Cordova, is seen Orizaba peak, 17,870 feet in altitude, most beautiful of all the Mexican volcanoes, and one of which the tourist has an easily accessible view from the line of Vera Cruz Railroad.

The line of volcanic peaks in which the two Sierra Madres terminate, and from which forms the southern rim of the basin region, may be likened to the apex of the letter V, the two arms of which correspond to the general outline of the Mexican Cordillera, and here these mountains extend in unbroken mass from sea to sea, terminating precipitately to the south in great escarpments facing the coast and the valley of the Rio de las Balsas. This is practically the southern terminus of the North American cordilleran system, the culmination of the mountain grandeur of that continent having no superior in the world for picturesque beauty.

South of the Rio Balsas is a narrow and precipitous mountain range attaining altitudes of 10,000 to 12,000 feet, and separating the valley of the Balsas from the Pacific coast. This range of mountains is fairly homogeneous and continuous to its culmination in Oaxaca, near the Isthmus of Tehuantepec, whence a northern spur connects it round the head of the Balsas valley with the volcanic scarp. At the Isthmus of Tehuantepec the mountain mass falls suddenly to within a few hundred feet of the level of the sea, beyond which the great antillean system rapidly assumes cordilleran proportions, culminating in a summit exceeding 4000 feet in altitude on the boundary line between Mexico and Guatemala.

In the limited area north of the Isthmus of Tehuantepec are twenty giant volcanoes, including Orizaba and Popocatepetl. Nearly all of these are more or less active, and give signs, at least by the emission of gases and vapours, of living energy beneath. Ceborico, the main crater of which is a pit 1000 feet in depth, was in violent eruption in 1870. Colima, the altitude of which is nearly 11,000 feet, has been intermittently in eruption ever since Europeans first beheld it.

H. M. WILSON.—*Journal American Geographical Society of New York*, 1897; partly quoted *Journal of School Geography*, Feb. 1898.

By permission of the American Geographical Society of New York.

Scenery of the Sierra Madre

The unbroken continuity of the Sierra Madre for nearly 2000 miles of length, and from 200 to 300 miles of width, makes it one of the largest compact mountain areas in the world. Excepting the great volcanic peaks of Popocatepetl and Ixtaccihuatl, to the south-east of Mexico City (which attain an altitude of over 18,000 feet), it is not distinguished by many points of exceptional elevation, but rather by the remarkably uniform altitude of the central ridge, which maintains its height of 11,000 to 13,000 feet for several hundred miles with little interruption. While the comparatively isolated summits of the Rockies—such as Mount Hood, Mount Shasta, Long's Peak, Pike's Peak, and the Spanish peaks—impress and delight the observer with their vastness, the Sierra Madre abounds in scenic surprises, and the constantly varying charm of the unexpected.

Travelling, for example, through the central ranges of Sonora (the north-western state of Mexico), one may traverse a group of high dome-topped hills, beautifully studded with dwarf pines or mountain oak, and clothed with long grasses—the home of the antelope, the white-tailed deer, and the wild turkey—and with scarcely any characteristics of the main range. In another mile these may suddenly be cut off by some huge chasm, surrounded by towering crags and steep water-torn gullies, perhaps sectioned out at their bases by remains of the curious terraced gardens constructed in past ages by a human generation now extinct.

Then may follow a glimpse of the main range crowned with its pine and cypress forests, and possibly streaked here and there with snow. At high altitudes throughout this range occur also the singular and charming level plots called the Llanos, and known in the Rocky Mountain range as "natural parks." These are frequently seen at a "parting of the waters," where an infant stream creeps quietly through the deep alluvial soil, and nourishes the meadow-like expanse surrounding it. Groups of stately trees are dotted over the tract, more varied in kind under the genial Mexican sun than farther north. Within another hour or two of mule-riding, all this may have given place to a series of precipitous heights, wild, ragged, and nearly bare of foliage, excepting cactus and mesquite, and topped, it may be, by some strangely jutting dyke of quartzite, carrying its hundred or two hundred ounces of silver to the ton. Going farther south, into Chihuahua, where the ranges of porphyritic cliffs are still loftier and wilder, features of exceptional interest will seldom fail to present themselves within the space of a day's ride. Here may be found at intervals the most fantastic forms of weathered "chimney stacks," or turrets, of decomposing gneissic granite, or castellated ridges, recalling many others on the course of the Green River and the Colorado. Here one may see, on a steep declivity of forest soil, a huge trench scored out by the fall of one of those immense meteorites which so curiously seem to have made choice of Mexican territory as their resting-place on our planet.

Here also, among the fastnesses of the highest ridge, not many miles from the mining camp of Pinos Altos, has been found a cascade which may probably—though I cannot venture to certify the fact—claim the distinction of being the highest vertical waterfall in the world. The volume of water passing over it in the rainy season is often considerable, and an actual measurement from the ledge showed a clear perpendicular drop of 948 feet before the water touches rock again.

O. H. HOWARTH.—*Geographical Journal*, Nov. 1895.

By permission of the Royal Geographical Society.

Formation of the Volcano of Jorullo

The Volcan de Jorullo was formed in the night of the 29th of September 1759. Its appearance is perhaps one of the most extraordinary physical revolutions in the annals of the history of our planet.

Till the middle of the eighteenth century, fields cultivated with sugar-cane and indigo occupied the extent of ground between two brooks called Cuitamba and San Pedro. They were bounded by basaltic mountains. These fields, watered by artificial means, belonged to the plantation (*hacienda*) of San Pedro de Jorullo, one of the greatest and richest of the country. In the month of June 1759, a subterranean noise was heard; hollow noises of a most alarming nature were accompanied by frequent earthquakes, which succeeded one another for from fifty to sixty days, to the great consternation of the inhabitants of the hacienda. From the beginning of September forwards everything seemed to denote a complete re-establishment of tranquillity, when in the night between the 28th and 29th the horrible subterranean noise recommenced. The affrighted inhabitants fled to the mountains of Aguasarco. A tract of ground from three to four square miles in extent, which goes by the name of Malpays, rose up in the shape of a bladder. The bounds of this convulsion are still distinguishable in the fractured strata. The Malpays near its edges is only 40 feet above the old level of the plain called the Playas de Jorullo; but the convexity of the ground increases progressively towards the centre to an elevation of 524 feet.

Those who witnessed this great catastrophe from the top of Aguasarco assert that flames were seen to issue forth for an extent of more than half a square league; that fragments of burning rocks were thrown up to prodigious heights, and that through a thick cloud of ashes, illumined by the volcanic fire, the softened surface of the earth was seen to swell up like an agitated sea.

The rivers of Cuitamba and San Pedro precipitated themselves into the burning chasms. The decomposition of the water contributed to invigorate the flames, which were distinguishable at the seat of Pascuaro, though situated on a very extensive table-land 4600 feet elevated above the plains of Las Playas de Jorullo.

Eruptions of mud, and especially of strata of clay enveloping balls of decomposed basalts in concentrical layers, appear to indicate that subterranean water had no small share in producing this extraordinary revolution. Thousands of small cones, from 6 to 10 feet in height, called by the natives ovens, stood forth from the Malpays. Although within the last fifteen years, according to the testimony of the Indians, the heat of these volcanic ovens has suffered a great diminution, I have seen a thermometer rise to 202° Fahr. on being held into the fissures, which exhale an aqueous vapour. Each small cone is a fumarola, from which a thick vapour ascends to the height of 40 or 50 feet. In many of them a subterranean noise is heard, which appears to announce the proximity of a fluid of ebullition.

In the midst of the ovens, six large masses, elevated from 1300 to 1600 feet each above the old level of the plains, sprang up from a chasm of which the direction is from N.N.E. to S.S.E. The most lofty of these numerous masses, which bears some resemblance to the Puys de l'Auvergne, is the great Volcan de Jorullo.

HUMBOLDT.—*Selections from the Works of Humboldt relating to Mexico.* Longmans, 1824.

Zones of Vegetation in Mexico

Let an imaginary journey start from Culiacan, the capital of the State of Sinaloa, a thriving city of several thousand inhabitants, situated at the base of the Sierra Madre, surrounded by cultivated fields, hardwood forests, and cactus jungle. In the journey eastward from this point the route quickly leaves the *tierra caliente*, or tropic region, to toil up rugged heights to a more congenial climate. Among the lower foot-hills are numerous ranches, the staple products of which are corn, sugar-cane, tobacco, and cotton. Here luxuriate oranges, figs, limes, bananas, and guava apples; also maguey, beans, and tomatoes, the cultivation of all being facilitated by irrigation. The fauna here is similar to that of the coast, but the flora changes rapidly; cacti and thorny bushes disappear, and in their places are extensive forests of precious hardwoods, including magnificent specimens of ironwood, rosewood, mahogany, ebony, and lignum vitæ, with trunks 10 to 20 inches in diameter, and 20 to 60 feet in height. Here flourish also logwood and guisachi, the first of which is exported extensively, while the latter is prized for the large amount of tannic acid which its sap contains; besides, there are gum-copal and agua-pepi, the ashes of which make rich soap lye. As an instance of the abundance and cheapness of the hardwoods, I may state that all the ties of the Sinaloa and Durango Railroad are of them, and that they were delivered at the road for 75 cents apiece. Farther in the mountains the river-gorge narrows, the mountain slopes on either side encroaching more closely and rising more abruptly until, at an elevation of 3000 or 4000 feet, it has diminished to a small torrential stream, which flows with steep grades over a rough-hewn and boulder-strewn channel. Here the trail leaves the stream, and winding up the confining slopes, brings us upon the surrounding ridges at an elevation of between 4000 and 5000 feet. This is the region of oaks, the beginning of the *tierra templada*, or temperate zone.

Leaving the river gorge in the neighbourhood of Canelas, the way enters one of the most magnificent regions in the world. The valley of Canelas is situated at an altitude of about 4500 feet. Its floor is like the bottom of a tea-cup, surrounded on all sides by a mighty rim, the crests of the Sierras, which rise to heights of 3000 to 5000 feet sheer above it. Here the climate is ideal, the temperature from year-end to year-end rarely exceeding

65 degrees as a minimum and 80 degrees as a maximum. Here grow in luxuriance all semi-tropic fruits and vegetables—the orange, fig, pomegranate, guava, apple, and lime; also the aguacate, or alligator pear, and the chirimoya, or custard-apple—most delicious of all fruits. Side by side with these are cherries, apples, peaches, plums, pears, and grapes; potatoes, cauliflower, wheat, oats, and other of our home vegetables and grains. This is the centre of a rich mining region, and from it are packed to the coast on burro and mule-back great quantities of silver ore, which exceed in richness the product of nearly any mining region in North America. In addition to these silver ores there are, near Culiacan, large deposits of hematite and magnetite, iron ore; also copper and cinnabar or mercury ore; and tin and gold placer deposits nearer the Sierra summits.

Beyond Canelas the trail winds up steep and rugged slopes to the *tierra fria,* or frigid zone, 8000 to 10,000 feet above the sea-level. Here are immense virgin forests of cedars, pines, firs, oaks, and other of our New England woods.

And here let us pause, on the crest of "La Cumbre," the summit of the Sierras, after the arduous 4000-feet climb, to feast our eyes upon the grand panorama displayed to the westward. Looking down over rugged mountain slope and distant low-lying plain, there is caught on the dim horizon a glint of the setting sun reflected upon the waters of the Pacific. Between it and the immediate foreground is a vast expanse of irregularly tumbled and confused mountain ranges and deep gorges. At our very feet is the village of Canelas, so near that it would seem as though we would cast a stone upon the house-roofs, a full mile vertically below. And as we stand and shiver, our feet embedded in the newly-fallen snow, we can clearly see the pink and golden hues of pomegranate and orange, products of a more gentle and balmy climate.

Resuming our imaginary journey, this is now for many miles through grand forests of conifers and picturesque little valleys, the floors of which are carpeted with a luxuriant growth of grass, through which meander in idle curves limpid mountain streams. Again the trail crosses low mountain ridges, separating the park-like valleys, or skirts the rocky walls of mighty *barrancas*, the precipitous depths of which seem to have been carved in the mountain side by a giant knife. This region is a veritable sportsman's paradise; wild turkeys are abundant, and deer are frequently seen and approached without difficulty, while the stillness of the camp-fire watches is broken by the grunt of a bear, the frequent and sonorous howl of the gray wolf, or the metallic scream of the jaguar. In some of these *barrancas* are magnificent waterfalls. Those of Bassascachi are perhaps the highest and most fairy-like in their outline.

Elsewhere the Falls of Regla tumble over queerly-shaped basaltic columns, while one of the largest and most imposing falls in Mexico is the cataract of Juanacatlan.

At last the Sierras are crossed, and the way leads down their eastern slope into the drier climate of the Central Basin region. Behind are monster mountain masses, bare of verdure and carved by erosion into many and confusing forms, while to the distant north is a fortress-like butte, in front of which stands a lone and sentinel rock of massive proportions, "El Pilar," well named the "pillar," one of the most striking freaks in a unique region.

Finally, the Sierras are left far behind, and descending a few thousand feet, the trail now winds through valleys 6000 to 7000 feet in altitude, and over rough mountain passes into the barren Central Basin.

H. M. Wilson.—*Journal of the American Geographical Society of New York*, 1897.

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For a graphic account of Mexican vegetation, see Ford, *Tropical America*, pp. 322-28.

The Vanilla Bean in Mexico

The true home of the vanilla, where it flourishes in its wild state, is a narrow strip about 30 miles wide, 5 miles back from the coast, and 90 miles long. The upper end of this strip is about 50 miles south of Tampico, and extends along the coast 90 miles towards the city of Vera Cruz, the bottoms along the Tuxpan, Cosonez, and Nautal rivers and the creeks contiguous constituting the richer parts.

The vanilla plant is a vine of a light-green colour, with a smooth, waxy, transparent bark. It has a thick, waxy-looking leaf, light-green in colour, 6 to 9 inches long, 1½ inches wide, and sharply pointed.

The vine reaches out tendrils which cling tightly to its tree support, but do not, as some believe, draw nourishment from the tree.

The vines require rich soil, heat, ventilation, shade, and moisture.

Rich pockets of land along the creeks and river bottoms are best. A profusion of wild vines of all kinds growing into a jungle, with abundant loose soil affording ventilation at the roots, is the best proof of the adaptability of the land. Let the land be free from sand, on account of drought, and free from clay, which would cause the vines to rot during the rainy season. Let there be plenty of small trees at the feet of which the vines may be planted. Trees which have smooth bark, and which never shed their bark or leaves, which grow to be no larger than 2 to 4 inches in diameter, and from 7 to 10 feet high, are best for this purpose. Usually a variety of such grow on all wild lands, and any of them are good, if the trunk of the tree be smooth.

The new vine will commence bearing the third year from planting, and full crops may be expected the fifth year. I have seen as high as thirteen full-sized beans in one cluster, and frequently see clusters of nine. Some vines have been known to produce as high as sixty-five beans at one time. Twenty beans to a vine is a good average.

Journal of School Geography, 1899.

By permission of Professor R. E. Dodge.

Wealth of Silver in Mexico

For several centuries the extraordinary wealth of the Sierras of Mexico in metalliferous veins—and especially those of silver—has been known to the world, although, from a commercial point of view, the actual production of that metal has latterly become a controversial and somewhat depressing topic.

The fissures of the great silver veins have usually been formed at points where the movements which gave rise to them have been at once deep-seated and apparently restricted in space. Hence they are generally found in the most inaccessible situations, and amongst rock scenery of the wildest and most chaotic character. Frequently their outcroppings are at the highest elevations; and many a mining camp may be descried amidst the cañons of the Sierra Madre, perched amongst precipices where even the agile mountain mule would hardly be supposed to find a footing. Two singular characteristics of the great "mother-veins" are noticeable throughout the range. The "strike," of course, of the main veins is almost invariably from north-east to south-west. So constantly is this the case that many miners would feel little faith in a vein that ran in any other direction. The other peculiarity of the deep-seated veins, usually described by experts as "true-fissure," is their very near approach to a vertical position in the rock containing them, frequently not exceeding 5° to 10° out of the perpendicular. Thus even in early times the workings have penetrated to unusual depths, some of the old mines being down to 1500 or 2000 feet. A visit to such a mine, which has been worked on the Mexican "sistema de rato," or rat's plan,—that is to say, burrowing after the vein wherever it leads,—is an experience not to be forgotten; nor, if one values one's safety and comfort, to be repeated. I remember such a visit a few years back, when to the general perils and difficulties was added the sudden assault of an immense colony of large bats, disturbed from a disused tunnel, from which they fled in such swarms that torches were knocked out, hats brushed off, and the floor of the tunnel, as we returned, cushioned with the bodies of those which had fallen. The naturalist may be puzzled to say by what means these creatures discovered their extraordinary retreat, and how they contrived, evening after evening, to find their way to the upper air by a corkscrew shaft over 300 feet deep, and covered at the top by a wooden shed.

It is scarcely necessary to remark that the ores of silver do not, as a rule, present themselves in a form attractive to the eye, and that the interior of a silver mine is as far as possible from being the fairy palace the name may seem to suggest. Occasionally, however, the bunches of native silver which occur exceptionally in the "wire" or "needle" form are of great beauty, and solid nuggets, though rare, are not unknown. One mine in Chihuahua produced from a globular cavity a solid silver ball, weighing 445 lbs., in which scarcely any foreign matter was present. Many of the tales of silver production, which sound more or less fabulous to European ears, are undoubtedly quite correct. A single mine has been known to produce the value of a hundred million dollars; and this being a matter of official record at a period when the metal was subject to taxation either by the Church or the municipal governments, or both, the return is far more likely to have been systematically understated than exaggerated.

O. H. HOWARTH.—*Geographical Journal*, Nov. 1895.

By permission of the Royal Geographical Society.

Poverty of Mexico Mountaineers

Not the least remarkable characteristic of the mountain population of Mexicans is the prevailing conditions of abject poverty in which they apparently prefer to live. There seems to be in this an actual heredity, apart from other and proximate causes, such as occasional barrenness of the soil, severity of climate, or native indolence. The latter is, of course, a chronic condition amongst them; but even in individual cases where it is less strongly marked, there seems to be an actual preference for the extremes of exiguity, simply because the same habit of needless and inexplicable misery has descended from father to son. It is no uncommon experience to see an almost incredible degree of actual physical suffering persistently endured under circumstances where the commonest comforts might be obtained almost without an effort, and this amongst a comparatively intelligent class in which the most profound ignorance of most of the Indian tribes cannot be assigned as a reason. Many a time it has chanced me to pass the night on the floor of some wretched "jacal," or shanty of interlaced saplings, where, at an elevation of 6000 or 7000 feet, the March winds rushed through almost unhindered.

Here I have seen the Mexican family and its guests stretch themselves around me, half wrapped in their scanty serapes, some prostrate with influenza, some with chronic bronchitis, and all bemoaning themselves audibly in the misery of cold, while for miles around the doors lay countless thousands of huge pine-logs and fallen branches, rotting on the ground, and five minutes' work by one of the children might have brought warmth and comfort to the whole community. But the scrap of fire used in toasting the tortilla has been allowed to die out.

It has never been the custom to use heat for any purpose but cookery, and the log-fire indulged in by the chance traveller for his own convenience is regarded as a strange extravagance, consistent only with those general conditions of exotic wealth which he is invariably supposed to represent. The accompaniments of a pack-mule carrying a blanket, an overcoat, and a box of tinned provisions, are sufficient to mark the foreign traveller of wealth and luxury, and draw upon him the wondering attention of the populace. At the same altitudes ranches are met with where, in the summer at least, every means exists for rendering the condition of life easy and even luxurious, and where a bountiful supply of such common necessaries as eggs, milk, fowls, fruits, and vegetables could be maintained without cost and almost without labour. Yet the free gifts of nature are ignored because it has been the custom to live upon horse-beans and tortillas, and there is no precedent for attempting anything more.

O. H. HOWARTH.—*Geographical Journal*, Nov. 1895.
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From Vera Cruz to the City of Mexico

Vera Cruz is the only pretence of a harbour on the Gulf side into which ships of average draught can enter, though nature has given the country several excellent ports on the Pacific coast. The entrance is dangerous, and can only be attempted by daylight, a low reef of coral forming the harbour, which is guarded by the fort of San Juan de Ulloa, now used as a prison for political and criminal offenders.

Very beautiful did Vera Cruz look as it lay along the shore, flanked on each side by a narrow belt of yellow sand, bathed in the rays of the morning sun, with a background of cocoa-nut trees waving in the breeze, and a dense tropical vegetation. In the distance were the blue mountains of the Sierra Madre and the snow-tipped peak of Orizaba, like a gigantic sugar-loaf. The cupolas of the churches dazzled the eye with the reflection of the sun's rays on their tile-covered domes; and low one-storeyed houses, with their white walls and green verandahs, looked invitingly cool. Behind us frowned the grim old fortress; while beyond, stretching to a cloudless horizon, was the gently heaving surface of the ocean.

Leaving the sandy waste that surrounds Vera Cruz, we soon entered a region of tropical vegetation, and for many miles the road lay through a tangled mass of trees and shrubs, entirely covered with wild convolvulus and other creepers. The heat, which was already beginning to make itself felt, was tempered by the sea-breeze. We stopped at pretty little stations, with houses embowered in a wreath of flowers, and shaded by waving banana trees, and began the gradual ascent which was to bring us to the high table-land. Soon we reached Cordoba, the great coffee-growing district, and here we were assailed by a crowd of Indian women and children offering bananas, pine-apples, and all sorts of tropical fruits and flowers for sale. Pine-apples cost about 1½d. each. Everybody bought; and the car was redolent with the odour of fruit and flowers.

After passing through apparently endless groves of coffee trees, with their dark glossy foliage, the scenery became wilder and grander. In the distance we caught a glimpse of Orizaba rearing its cone-shaped, snow-clad peak to the high heaven; and a short run through the valley of Orizaba brought us to the town of the same name. We could distinguish the quaint old church and white houses of this picturesque little town lying at the foot of high mountains, whose tops were hidden among the clouds, and surrounded by plantations through which ran pretty lanes lined with banana trees.

The scenery now became inexpressibly grand, and the eye was never tired of watching the varied landscape lying far below, viewed from precipices which made one shudder to think of the consequences of an accident. High above us was to be seen the road, winding along the sides of the mountains. Sometimes we were carried along the side of a torrent rushing far below us, or skirted a ravine with the road running parallel on the other side, to reach which we crossed a magnificent iron bridge in a horse-shoe form; at other times plunging into tunnels and cuttings, hewn from the solid rock, to emerge into fresh scenes of beauty. As the grade became steeper we became aware of the rarefied atmosphere by the quickened action of our lungs. The air grew chilly, and by the time we had reached the highest point on the line, nearly 10,000 feet above sea-level, we should have been glad of warmer clothing. Then began the gradual descent into the table-land. The dry, dusty plains, enlivened only by the monotonous rows of maguey plants, which seem to stretch away to the foot of the mountains, took the place of the luxuriant tropical vegetation. The air again became warm, but with a sultry, feverish heat, which seemed to dry up the pores of the skin,—a process exceedingly unpleasant to the subject, and very materially aided by the cloud of fine dust which, despite every precaution, penetrated the car. As the sun sank we were glad to think that our journey was nearly at an end. Soon afterwards the train slowly rolled into the station, and we were in the city of Mexico.

ANON.—*Through the Land of the Aztecs.* Sampson Low.
By permission of Messrs. Sampson Low.

Mexico City

From a singular concurrence of circumstances, I have seen successively, within a very short space of time, Lima, Mexico, Texas, Philadelphia, Washington, Paris, Rome, Naples, and the largest cities of Germany. Notwithstanding the unavoidable comparisons, several of which, one would think, must have proved disadvantageous to the capital of Mexico, it has left in my mind a recollection of grandeur, which I principally attribute to the majestic character of its situation and the surrounding scenery.

Nothing, indeed, can present a more rich and varied appearance than the valley, when, under a sky without a cloud, and of that deep azure which is peculiar to the dry and rarefied air of high mountains, we transport ourselves to the top of one of the towers of the cathedral, or ascend the hill of Chapultepec. A beautiful vegetation surrounds this hill. Old cypress trunks raise their naked heads above those of the schinus, which resemble in appearance the weeping willows. From the summit of the porphyritic rock of Chapultepec the eye sweeps over a vast plain of carefully cultivated fields, which extend to the very foot of the colossal mountains covered with perpetual snow. The city appears as if washed by the waters of the Lake of Texcuco. Large avenues of elms and poplars lead in every direction to the capital; and two aqueducts, constructed over arches of very great elevation, cross the plain. Towards the south the whole tract appears to be an immense garden of orange, apple, cherry, and other European fruit trees. This beautiful cultivation forms a singular contrast with the naked mountains which enclose the valley, among which the famous volcanoes of La Puebla, Popocatepetl, and Iztaccihuatl are the most distinguished.

HUMBOLDT.—*Selections.* Longmans.

For the modern buildings see LADY HOWARD OF GLOSSOP, *Journal of a Tour*, p. 127. Sampson Low.

IX. TYPICAL RAILWAY JOURNEYS IN THE UNITED STATES

New York to Boston

SOON after quitting New York the line runs by the shore of Long Island Sound, and passes several considerable towns and villages devoted for the most part to various forms of industry and to sea-bathing. For a distance of some 70 miles to New Haven the sea is constantly in view. New Haven, though not the capital, is the largest city of the State of Connecticut. It carries on a flourishing trade with the West Indies, and is the seat of many important manufactures. The University of Yale occupies a prominent position in New Haven, and its various schools are attended by upwards of 1000 students.

There is certainly no other city whose immediate surroundings are so full of beauty and interest as those of Boston. Cambridge, the seat of Harvard University, is distant about five miles. The charming enclosure known as Chestnut Hill, which contains the extensive reservoirs which supply Boston with water, forms one of the most delightful drives to be found in the neighbourhood of any capital in the world.

Boston, somewhat after the fashion of New York, is built upon a spur of land surrounded on three sides by water, the Charles River separating it on the north from Charlestown, where Bunker's Hill is situated, that portion of the river between the two being crossed by five bridges. The famous and beautiful common might be assumed roughly to represent the centre of the city, the business quarter lying to the east and south of it, the newer and more fashionable streets running to the west. Taken as a whole, Boston may be said to be the handsomest city of New England.

T. FITZPATRICK.—*A Transatlantic Holiday.* Sampson Low.
By permission of Messrs. Sampson Low.

From New York to New Orleans

We took our places in a Pullman car for a pull across the continent. At Philadelphia the Boston part of the train was delayed by heavy snowdrifts, so the New Yorkers waited five hours. However, we dined together in unity as we steamed on to Washington. Night found us in the Shenandoah valley, and morning dawned upon us near the Natural Bridge. All traces of snow were gone. It was a great and beneficent change from icy winter to early spring.

Through the day we journeyed through Virginia in Eastern Tennessee. We had elected to pass by Knoxville and run to Chattanooga, and find our first stopping-place on the summit of Lookout Mountain. From this summit portions of seven states can be seen. Far to the north-west the blue outlines of the Cumberland Mountains line the horizon. On the east lie Walden's Ridge and Sherman Heights, backed by the Great Smokies. In front the Tennessee River sweeps in wide curves through a vast semicircular plain, and the busy town of Chattanooga, with its converging lines of railroad, is spread out as on a map.

From Lookout Mountain to the city of Birmingham, Alabama, is a great change, but a few hours' ride on the famous Queen and Crescent Railway effected the transformation. Birmingham was all alive. Its electric cars hissed along wide avenues, making the air resonant with gongs and the whirr of wheels. It were better to sleep on the rumbling train, and so the rising sun found us in the middle of Lake Pontchartrian, seven miles of which are crossed by the railway on a bridge of piles before entering New Orleans.

C. A. STODDART.—*Beyond the Rockies.* Sampson Low.

By permission of Messrs. Sampson Low.

For Philadelphia, see p. 122.
For Washington, see p. 123.
For Shenandoah Valley, see p. 99.
For the Natural Bridge, see LADY HOWARD OF GLOSSOP, *Journal of a Tour*, p. 296.
For the Cumberland Mountains, see p. 101.
For the Great Smokies, see p. 100.
For Chattanooga, see p. 103.
For New Orleans, see p. 141.

From the Missouri to the Great Salt Lake

For over 500 miles after leaving Omaha the Pacific Railroad is thrown in an almost continuous straight line across the Great Plains. We look around and see nothing but a boundless sea of grass, a verdant undulating ocean stretching to the far-distant horizon in one vast perpetual sweep. An overpowering sense of vastness is conveyed to us as we speed over these immense plains. It is scarcely possible to comprehend so enormous an extent of sameness, such a uniformity of feature over so vast a portion of the the country. For the first 200 miles you find the plains in the vicinity of the railway dotted with the settlements of a frugal people, who have turned the land to the best account, and found it wonderfully fertile and productive. Groves of cottonwood trees are frequently seen in the "valley" of the Platte, and are said to thrive amazingly, growing some 8 feet or more a year.

After the Platte valley is passed, cultivation is left behind, and the rest of the prairie crossed by the Pacific Railroad is devoted to the raising and grazing of stock.

Seen now at the beginning of summer, the plains present an appearance of exquisite freshness and bloom. The tall prairie grass is of the greenest, and bright-coloured flowers, springing from a smooth stoneless surface, deck the ground in gayest profusion. But what a change will have been wrought in another two months. The green grass will then have become brown and dried up, the beautiful flowers will have disappeared, ugliness will reign supreme, and a more unpromising and cheerless sight will scarcely be found on the face of the earth.

There is a gradual ascent in the journey across the plains of Nebraska from the Missouri. Omaha itself is 966 feet above the sea, and Julesberg, 376 miles from Omaha, has an elevation of 3500 feet, the rise along the whole distance being gradual, though at the same time nearly imperceptible. Sidney stands 570 feet higher. In the next 19 miles we rise 297 feet.

About 60 miles farther we sight the Rocky Mountains. It is a long blue line of mountains, far away in Colorado to the south, and there is Long's Peak, snow-capped, towering to a height of 14,270 feet. No need of field-glasses in this part of the world. If the day were clear we should see Pike's Peak, 140 miles distant.

The Black Hills now appear to the north, and soon we are approaching Cheyenne.[1] From Cheyenne a line branches south for 106 miles to Denver, the capital of Colorado.

We now rise rapidly. Snow galleries are frequent. Ravines open out beneath. We reach Sherman, the highest elevation which the Pacific Railroad attains. It has an altitude of 8242 feet. What a glorious panorama is now before us. The Medicine Bow Mountains shut in the view to the west, rising dark and blue into the region of perpetual snow. Spreading out before us, in one grand sweep of 106 miles or more, are the Laramie Plains, a very paradise for sheep, for the grass is of the richest.

During the night we passed over that high table-land or dividing ridge of the Rocky Mountains, which constitutes the continental watershed. At Green River the peculiar scenery of the Rocky Mountains commences. The bluffs in the neighbourhood of the river assume every variety of fantastic shape, and further on, as Ogden is approached, the railway is laid through a remarkable gorge, called Echo Cañon, where Nature is strange and weird in the extreme. The variety of colour in many of these rocks, and the regularity with which the layers of each are arranged, is most extraordinary. Red and grayish buff are the predominating colours, but there are also yellow and green layers, and here and there a layer of white sand. The sight that we witnessed early this morning, of a valley enclosed by such rocks, lit up by the light of the morning sun, rendering their colours all the more brilliant and glorious, is one not likely ever to be forgotten. Emerging from the cañon we have a grand view on our left of the snowy Wasatch Mountains, on the other side of which lies Salt Lake City. Traversing for eight miles an open, well-cultivated valley, we come to another cañon called the Weber. As we enter it we pass on our left a tall solitary pine. This is the "Thousand Mile Tree," and marks the exact distance we have travelled since leaving Omaha. We emerge from the cañon and enter a fertile valley, 10 miles in length, hemmed in by lofty heights. Then we come to the Devil's Gate Cañon, the third and last gorge penetrated by the Union Pacific Railway.

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[1] Pronounced Shienne.

The Rocky Mountains now crossed, we emerge into the Great Salt Lake valley, which is 120 miles in length, and from 30 to 40 miles in breadth. Passing through green fertile lands, we reach Ogden, the junction for Salt Lake City, and the terminus of the Union division of the Pacific Railroad. The distance from Omaha is 1033 miles, and from San Francisco 883 miles. Passengers bound west change into the "silver palace" cars of the Central Pacific; passengers bound for the Mormon metropolis proceed by the cars of the Utah Central. At 8.45 p.m. we find ourselves in Utah's capital.

W. G. MARSHALL.—*Through America.* Sampson Low.
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For the Plains, see p. 143.
For the Platte, see p. 144.
For Denver, see p. 230.
For the Wasatch Mountains, see pp. 180-182.
For the Salt Lake Valley, see pp. 182-185, 228.

From Salt Lake City to San Francisco

Starting from Salt Lake City northwards, the road lies through suburbs of orchards and gardens, many of them smothered in red and yellow roses, out on to the levels of the Great valley. Beyond the magic circle of the water-wizard are patches of fen-land still delightful to wild-fowl, and patches of alkali blistering in the sun; but all about them stretch wide meadows of good grazing ground and bright fields of lucerne or alfalfa, just purpling into blossom. What a gift this lucerne has been to Utah. Once get it well started (and it will grow apparently anywhere), the alfalfa strikes its roots ten, fifteen, twenty feet into the ground, and defies the elements. Three times a year can the farmer crop it, and there is no fodder in the world that beats it.

The Salt Lake comes in sight, lying along under the mountains on the left, and on the right the Wasatch range closes in, the upper slopes all misty with gray clouds of sage-brush, and the lower vivid with lucerne. Round the corner lies Ogden, and as we approach it the great expanses of meadow stretching down to the lakes and the wide alfalfa levels give place to a barren sage veld, where the sunflower still retains ancestral dominion. Ogden is the meeting-point of the northern and southern Utah lines of rail, and, more important still, of the Union Pacific and the Central Pacific also.

From Ogden northwards our road gradually bears away westwards from the hills, leaving cultivation and cottages to follow the line of irrigation along their lower slopes. The lake dwindles out into a marsh and is gone, and we speed away across levels of dreary alkaline ground. Away from Mormon industry, the sage bush flourishes like green bay trees. To the west, the dreary mountains of Nevada herald a region of barren desolation. We reach the Humboldt River, a broad and full-watered stream, winding along among ample meadows. Then on to the desert again, with the surface of the alkali land curling up into flakes, and the long gray greasewood sparsely scattered about it.

Awaking next morning was a wonderful surprise. We had gone to sleep in Nevada in early summer, and we awoke in California late in autumn. In Utah two days ago, the crops had only just begun to flush the ground with green. Here, to-day, the corn-fields were the sun-dried stubble of crops cut weeks ago. When I awoke I was in a fine, park-like, undulating country, studded with clumps of oak trees, but one continuous corn-field. After a while came vast expanses of meadow, in which great flocks of sheep and herds were grazing. Then came the corn-fields again, an unbroken expanse of stubble, yellow as the sea sand, and seemingly as interminable. Passing from Sacramento we find ourselves once more in a world given up to harvesting. A monotonous panorama of stubble and standing crops, with clumps of oak timber studding the undulating land, leads us to the diversified approaches to San Francisco.

P. Robinson.—*Saints and Sinners.* Sampson Low.
By permission of Messrs. Sampson Low.

A Journey across the Rocky Mountains

A run to the Rocky Mountains naturally has its starting-point in Chicago, a wonderful railway centre, to which all the great railway systems of the United States seem to converge. The first skip is to Denver, a matter of 1210 miles by the Atchison, Topeka, and Santa Fe Railroad, it being possible to remain in the same car all the forty-two hours' journey. The ride across the States of Illinois, Missouri, and Kansas is almost devoid of interest. There is a great sameness about all American large towns and cities, and state capitals and capitols, and it is only when the train has fairly entered the State of Colorado, and reaches Pueblo, that the real interest commences. The line now runs in view of the first range of the Rocky

Mountains until it reaches Denver, one of the most remarkable cities in the States, situated on a plateau a mile above sea-level, in full view of a range of snow-burdened mountains—another great railroad centre, destined to be a close rival with Chicago; the rendezvous of the mining interests of Colorado and Utah.

The Denver and Rio Grande Railroad, which proudly calls itself "the scenic line of the world," makes its arrangements with a view to the maintenance of this reputation. Leaving Denver by the early morning train of this company, a closer acquaintance is made with the Rockies, as the railroad skirts their bases for about 120 miles. Curious natural formations perched on the summits of conical hills, strange rocks and monoliths, some of them of colossal size, rapidly pass into and out of view, till, rising to an elevation of 7238 feet above the sea-level, a beautiful sheet of water called Palmer Lake is reached. A curious phenomenon about this lake is that it is so equally poised on the summit of the "Divide," that its waters flow through outlets northwards into the Platte River, and southwards into the Arkansas.

The next stop is Colorado Springs, which so lies under the shadow of the snow-capped Pike's Peak (14,137 feet high), that in the short days the sun drops out of sight behind the mountain with startling suddenness at four o'clock in the afternoon.

At the manufacturing and smelting town of Pueblo the railroad turns to the west, and commences to pierce the Rockies, until at 161 miles from Denver, Cañon City is reached—justly so named, for it stands at the entrance to a most stupendous cañon, said to be the greatest penetrated by any railroad, for the Grand Cañon of the Arkansas is by a universal consensus of opinion acknowledged to be one of the wonders of the world. The Arkansas River, which rises 175 miles to the north-west of Cañon City, here breaks its way through the front range of the Rockies, by one of those mighty gorges which almost appear to be cleft as cleanly and early, as if some Titanic nature-builder had cracked the earth's crust with a gigantic blow of his sledge-hammer during some of his moulding processes. Anyhow the river has found and utilised the passage to convey its waters through the mountains, and then to enter upon its eventful course to the Mississippi.

Just beyond the city, and quite suddenly, the train enters the Grand Cañon. Such a sudden transformation is difficult to describe. Out of bright sunshine into a gloomy gorge, through which the river angrily dashes along in whirlpools and rapids, and from which has been stolen in part, and part blasted from the rock, just sufficient room to lay a set of rails. Indeed, in one part even this could not be obtained, so iron girders are fastened on the rock on either side, and a platform suspended from these, upon which the track is laid, running not across, but parallel with and above the river. The ride through the cañon is wild in the extreme. On the left the river, a seething torrent, roaring even above the noise of the train, bounded by a precipice rising in height to 2600 feet, with pinnacles at points even higher, until the "Royal George" becomes dark and sombre, it being impossible for the sun's rays to penetrate its depths in some places. The sky above forms a deep blue arch of light, the way being merely a fissure through the heights. Threading its sinuous way in a very snake-like fashion, the train creeps round every bend of the gorge, every turn of the river, doubling up in a most extraordinary fashion—which could never have been suspected of these big American cars, for on some of the curves travellers on the last car seem able to throw an orange across to the engine when it has rounded the bend.

The description of this cañon is in the main points applicable to most of the others traversed by these railroads, although each has its distinctive features, but all alike are majestic, stupendous, sublime.

Emerging from the "Royal George," the narrow valley of the Upper Arkansas is traversed, with the striking serrated peaks of the Sangre de Cristo range (Blood of Christ) close at hand. Then the Collegiate Peaks come into view, named after the Colleges of Harvard, Yale, and Princetown, and shortly after Leadville is reached, which is the greatest mining camp and highest city in the world, having an elevation of 10,200 feet. The railroad ascends still higher, rising 218 feet in 7 miles, where it reaches the top of Tennessee Pass. A very rapid descent is now made, the track dropping 1747 feet in 12 miles, the train running all the way under brakes only, and sometimes in narrow gorges for miles under long snow-sheds, and speeding through, in quick succession, the Red Cliff and Eagle River Cañons. Here can be seen one of the most remarkable of the many wondrous sights so plentifully spread by Nature in this region—the Mount of the Holy Cross, so called because it bears an everlasting cross of snow on its bosom, which is the effect of two gullies, an upright one of about 1500 feet in length, crossed by a transverse one of about half the length, and always filled with deposits of snow, never reached by the sun. In winter this pretty effect is not decipherable, as it is lost in the mountain's great white coverlet. The Eagle River Cañon not only shows some wonderful specimens of natural beauty, but also the wonders of human handiwork, for its sides and summits are made the resting-places for the shaft-houses and dwellings of miners placed in apparently the most inaccessible spots. Some are perched 2000 feet above the track, more like the eyries of eagles than human abodes. The cañon of the Grand River which follows is 16 miles in length, and rivals in some places the Grand Cañon of the Arkansas. The route follows the Grand River to its confluence with the Gunnison at Grand Junction, then traversing for about 150 miles what is known as the Colorado Desert. The railroad now climbs the Wasatch range, a constant ascent for a distance of 95 miles, passing through the famous portals of Castle Gate, which stand at the entrance of Price River Cañon. Two high pillars or ledges of rock, offshoots of the cliffs behind, stand like sentinels guarding the cañon. Between them, separated only by a narrow space, the river and the railroad both run, one pressing closely against the other. Once past the gate and looking back, the bold headlands forming it have a new and attractive beauty. No other pinnacles approach them in size or majesty. Fantastic forms abound in the cliffs which hem in the track. Here a mighty castle with moats and towers, loopholes and bastions; then a gigantic head or monument appears; and so until, having crested the summit, the train rapidly rolls into Utah Valley, with Utah Lake quietly resting in its centre, and shortly after reaches Salt Lake City.

C. H. BELLAMY.—*Journal of the Manchester Geographical Society*, 1894.

By permission of the Manchester Geographical Society.

By the South Pacific

We left Los Angeles, by the South Pacific line, for El Paso. Through lovely woods, gorgeously tinted, grand chains of mountains running parallel on each side of the valley, by degrees the land becoming arid, still in California, but where no irrigation is.

Cactus of varied kinds, some gigantically tall, of every eccentric shape, covered with fruit and flower, mingled with yuccas of immense height. On, into still more arid land, cactus only, and yellow mountains completely bare, glowing like burnished copper in the fiery sun. For 150 miles we speed through the burning Colorado desert—a vast deep basin, 265 feet below sea-level in its deepest parts, supposed to have once formed part of the Gulf of California, and to have gradually dried up, leaving immense deposits of salt, glittering like silver and diamonds in the burning sunshine, relieved here and there by yuccas and cacti, many of them 40 feet in height. Here and there an oasis. Palm Springs, the loveliest, revels in the green shade of exquisite groves of date-palms, the only natural growth of this variety in California.

Soon the great Colorado River is reached and crossed, its banks beautifully fertile and fringed with poplars, forming the eastern boundary of California. The town of Yuma, said to be the hottest in America, rises on the farther bank of the Colorado, and we found ourselves in the strange and arid but most interesting State of Arizona. All is rid sand, full of strange uncanny growths of gigantic eccentric cacti; great bare sun-baked parallel chains of finely peaked hills. In the dim light of the stars we could see the strange vegetation seeming to loom to the sky.

In the morning we stopped for breakfast, and then on again through a boundless stretch of bare, undulating country, majestic in its desolation, the soil a rich red purple; with, in the far distant horizon, a superbly shaped, pyramid-like, snow-peaked mountain, rising 10,000 feet from the plain. For hours it remained in sight, till at length we reached the Rio Grande, its course marked by waving lines of gold-foliaged trees, and crossed into Texas, covering an expanse greater than that of France. We were, however, for the present to see but little of it, for we had reached El Paso.

Lady Howard of Glossop.—*Journal of a Tour in Canada, United States, and Mexico.* Sampson Low.

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For an excellent description of the desert vegetation, see Stoddart, *Beyond the Rockies*, pp. 44-46.
For railway journeys in Canada, see pp. 68, 74.
For railway journeys in Mexico, see pp. 211, 219.

Texas and Arkansas (El Paso to St. Louis)

It didn't look like a country of many cities. It was Texas. The grazing land stretched on either side of us to the horizon. The meadows were fairly ablaze with flowers. And so on for a hundred miles, and then Texas begins to undulate. The undulations increase into valleys, and splendid they are, with their rich crops of wild hay. As the evening closed in we began to enter a country of dark jungle-looking land.

In the morning everything had changed. Vegetation was tropical. Occasional tracts of rich meadow, with splendid cattle and large-framed horses, alternated with brakes of luxuriant foliage concealing the streams that flowed through them, while fields of cotton in lusty leaf, gigantic maize, and league after league of corn stubble showed how fertile the negro found his land.

How beautiful Texas is. For half a day and a night we had been traversing grazing land, and for half a day fine timber growing in a soil of intense fertility. And now for half a day we are in a pine country, sometimes with wide levels of turf, sometimes with oak and walnut so thickly intermingled with the pines that the whole forms a magnificent forest. Passion-flowers entangle all the lower undergrowth, and up the dead trees climb fine scarlet creepers. The afternoon passes in an unbroken panorama of forest views, with great glades of meadow and patches of maize and cotton. Then Atalanta, in a country that is very beautiful.

Arkansas remains on the mind as a vast forest standing in swamps. The old trees, hung with moss, stand ankle-deep in brown stagnant water. The glades are all pools, and wherever a vista opens there is a long bayou, stretching between aisles of sombre trees. There is a mysterious silence about the gloomy trees. No bird lives in them. In the sullen water there are turtles moving, and now and then a snake makes a moment's ripple on the dull pools. Sunlight never strikes in. The hamlets are few and far between, and it is only once or twice during the day that we strike a village worthy of the name.

P. Robinson.—*Sinners and Saints.* Sampson Low.

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